Abstract

We consider the pretrial settlement model of Bebchuck (1984), where trial results from information asymmetry between the parties, and assume that the plaintiff exhibits reference-dependent preferences as proposed by Kőszegi and Rabin (2007). We find that reference-dependent preferences increase the likelihood of settlement. A higher judgment award increases the likelihood of settlement for sufficiently low probability of winning the trial for the plaintiff and a high degree of loss aversion. Higher litigation costs have ambiguous effects on the likelihood of settlement. We consider several extensions: Under the British rule the likelihood of settlement is larger for a high degree of loss aversion. Reference-dependent preferences for the defendant increases the likelihood of settlement for a high probability of winning the trial for the defendant. For the incentive to gather and reveal information, reference-dependent preferences increase the incentive to gather information. The informed party has no incentive to voluntarily reveal her type.

Keywords: Pretrial settlement, Reference point, Loss aversion.

JEL classification: D81, K41.
1 Introduction

In the behavioral law and economics literature several studies show that in the context of pretrial settlement both parties are loss averse. The idea of loss aversion was firstly formalized by Kahneman and Tversky (1979): individuals form some reference point and compare the actual outcome to this reference point. If the outcome lies below the reference point, individuals perceive the outcome as a loss and as a gain otherwise. Losses are felt more strongly than gains, which induces individuals to engage in loss avoiding behavior.

In the context of pretrial settlement, experimental evidence suggests that different reference points might apply. For example, Belton et al. (2014) and Korobkin and Guthrie (1994, 1998) find that individuals perceive the wealth before the occurrence of the accident as the reference point. Since the actual harm is often hard to determine and there is uncertainty about winning the trial, the settlement offer often falls short of the actual loss of the plaintiff. In this case settling feels like a loss compared to the reference point and the plaintiff tries to avoid the certain loss by going to court. Studies of Guthrie (2002) and Rachlinski (1996) suggest that the plaintiff already adapts to her loss before the pretrial settlement negotiations begin. In this case the reference point of both parties amounts to 0. The plaintiff perceives the outcome from settling the case or trial as a gain, whereas the defendant perceives the outcomes as a loss. They find that plaintiffs behave in a risk-averse way, whereas the defendant is risk-seeking. Studies of Korobkin (2002, 2009) show that the target to extract a certain settlement amount might also act as a reference point. For a given expected payoff of trial, higher targets lead to a higher settlement demand and to a lower probability of accepting settlement offers below the target.

Recent research shows that in contexts where individuals expect a change in their wealth in the near future, expectations as a reference point better explain individual’s behavior than status quo reference points. Since in pretrial settlement negotiations both parties face uncertainty about the settlement offer and the potential trial outcome, expectations as reference points might play a more important role than status quo reference points.

\footnote{For an overview see Zamir (2015).}
We therefore incorporate reference-dependent preferences as proposed by Kőszegi and Rabin (2007) in the pretrial settlement model of Bebchuck (1984). It is assumed that there is uncertainty regarding the plaintiff’s probability of winning the trial. The defendant knows the probability of winning the trial whereas the plaintiff only knows the distribution over the winning probabilities. The plaintiff proposes a settlement offer, which the defendant either accepts or rejects. In case of a rejection we assume that the plaintiff always takes the case to court. We first assume that only the plaintiff exhibits reference-dependent preferences. With reference-dependent preferences the expected utility of the plaintiff consists of “consumption utility”, which is the standard utility from the expected outcome of settlement and trial, and of “gain-loss utility”, which depicts the utility from comparing the actual outcomes to the reference point. The reference point is given by the expected outcomes from pretrial settlement and trial, weighted with the probability that these outcomes occur. The gain-loss utility consists of the sensation from comparing each potential outcome to the reference point. For the solution concept we use the choice-acclimating personal equilibrium (CPE) developed by Kőszegi and Rabin (2007). This equilibrium concept allows the parties to take into account how their strategy choices affect the reference points. The parties then choose the strategy which maximizes their utility for all potential reference points.

We find that reference-dependent preferences for the plaintiff unambiguously increase the likelihood of settlement compared to the benchmark case. Demanding a higher settlement amount leads to a higher likelihood that the settlement offer is rejected. The plaintiff ends up in court more often, where she experience an additional loss from the uncertain trial outcome. However increasing the settlement offer decreases uncertainty in the settlement stage. The plaintiff anticipates to be in court more often, which reduces the costs from the gain-loss utility. A higher settlement demand also influences the loss sensation from comparing the settlement payoff to the trial payoffs. This effect depends on whether the settlement offer lies above or below the payoff from winning the trial: If the settlement offer is below the payoff from winning the trial, failing to settle feels like loss, if the plaintiff loses the trial, but like a gain if she wins the trial. A higher settlement offer decreases the loss sensation from settling the case compared to winning, but increases the loss sensation from losing the trial compared to settling the case. If the settlement offer is above the payoff from winning the trial, failing to settle always feels like a loss. The
plaintiff hence compares the settlement payoff to the expected payoff from trial. A higher settlement offer increases the payoff from settling the case out of court and increases the expected payoff from trial through a higher chance of winning. As we show below the negative effects outweigh the positive ones and reference-dependent preferences for the plaintiff unambiguously increase the likelihood of settlement.

For the comparative static results we find that an increase in the judgment award increases the likelihood of settlement for sufficiently low probability of winning the trial for the plaintiff and a high degree of loss aversion. The difference in payoffs between settling and trial and losing and winning the trial gets larger and the plaintiff tries to avoid these larger losses by settling out of court. Higher litigation costs from either the plaintiff or the defendant have ambiguous effects on the likelihood of settlement. In contrast to the benchmark model, these prediction better fit empirical evidence regarding the effect of a higher judgment award or litigation costs on the likelihood of settlement. In the discussion we show that with status quo reference points, the comparative statics results do not change compared to the benchmark model.

We consider several extensions: We first compare the likelihood of settlement under the British rule and the American rule. Under the British rule, the difference in payoffs between settling and trial are larger and hence the marginal effects of a higher settlement demand on the gain-loss utility are more pronounced. We find that for a high degree of loss aversion the British rule increases the likelihood of settlement.

We then consider the case, when both parties exhibit reference-dependent preferences. In this case the plaintiff is able to extract a higher settlement offer from the defendant. Hence the costs from missed settlement increase, which increases the likelihood of settlement. However, reference-dependent preferences of the defendant have ambiguous effects on the screening efficiency of the settlement offer from the plaintiff. Raising the settlement offer leads to more defendant with weak cases to deny the settlement offer. Defendants with weak cases expect to lose the trial more often, which decreases their costs from the gain-loss utility. However they win less often and are therefore in expectation more often in the loss frame, which increases their costs from the gain-loss utility. We show that for a sufficiently high probability of winning the trial for the defendant, the screening is less efficient and hence reference-dependent preferences for the defendant increase the likelihood of settlement.

\[\text{See e.g. Fournier and Zuehlke (1989) or for an overview Kessler and Rubinfeld (2007).}\]
hood of settlement. Reference-dependent preferences of the defendant have ambiguous effects otherwise.

Finally we analyze the incentive for the plaintiff to engage in costly information research and for the defendant to voluntarily reveal his type. We therefore extend the model of Farmer and Pecorino (2005) and allow for both parties exhibiting reference-dependent preferences. We find that reference-dependent preferences for both parties increases the incentive for the plaintiff to engage in information searching. Intuitively, through information research the plaintiff can avoid any kind of uncertainty and hence avoids the additional costs from the gain-loss utility. Since the defendant is loss averse, the plaintiff can extract a higher settlement amount if she learns the type of the defendant, which again increases the incentive for the plaintiff to engage in information research. Like in the standard model a defendant with reference-dependent preferences has no incentive to voluntarily reveal his type.

In the discussion section we discuss the case of a narrow bracketing plaintiff. In this case the plaintiff considers the lotteries from pretrial negotiations and trial separately. This also resembles the case, when the parties feel the loss from a missed settlement opportunity right after the settlement stage but before the occurrence of trial. This case might seem more realistic since there might pass plenty of time till the trial process actually occurs after failed settlement negotiations. In this case the plaintiff’s gain-loss utility consists of the comparison of the payoff from settling out of court to the expected payoff of trial. For a narrow bracketing plaintiff, we find that reference-dependent preferences have ambiguous effects on the likelihood of settlement. The reason for the difference to the ”broad bracketing” result, is that the plaintiff does not consider each trial outcome separately, but only considers the expected payoff from trial. Hence in the settlement stage, failing to settle leads to a smaller loss in the narrow bracketing case.

The rest of the paper is organized as follows: the next section overviews the related literature. In the third section we incorporate reference-dependent preferences for the plaintiff into the pretrial settlement model of Bebchuck (1984). We then derive the choice-acclimating personal equilibrium and compare it to the benchmark outcome. The fifth section describes the comparative statics results regarding the probability of settlement. In the sixth section we consider several extensions. In the discussion section we discuss

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potential different reference points and conclude in the last section.

2 Related literature

Our model foremost relates to models of pretrial settlement. We are adopting the model of Bebchuck (1984), where the uninformed party makes a screening offer to the informed party. Reinganum and Wilde (1986) consider a signaling model, where the informed party signals her type through the settlement offer.

Farmer and Pecorino (1994) extend the model of Bebchuck (1984) by assuming that the party who receives the settlement offer might be risk averse (in their case it is the plaintiff who receives the offer). The defendant is uncertain whether he negotiates with a risk-averse plaintiff or a risk-neutral plaintiff. The defendant offers a settlement amount equal to the certainty equivalent of trial, which all types accept, or a lower settlement offer, which only the risk-averse plaintiffs accept. Therefore depending on the fraction of risk-averse plaintiffs a ”hard” offer is more profitable for the defendant. Since only risk-averse plaintiffs accept the ”hard” offer, risk-aversion on the receptor’s side might decrease the likelihood of settlement if there is uncertainty over whether the receptor is risk-averse or not.

Langlais (2010) extends Bebchuck’s model by assuming that the informed plaintiff is disappointment averse. The outcome of trial is ”disappointing” for the plaintiff, if it is lower than the certainty equivalent. Similar to our model of reference-dependent preferences the plaintiff compares the actual outcome to some ”reference point”. However in Langlais’ model, disappointment-aversion takes the form of an under assessment of the probability of winning the trial. In contrast to our model it is the plaintiff who is informed about winning or losing the trial and the defendant makes the settlement offer. Disappointment-aversion increases the gain from settling, since the defendant can extract a higher settlement amount from the plaintiff. However the screening efficiency of a higher settlement offer on the plaintiff’s type is ambiguous under disappointment aversion, which renders the overall effect ambiguous. This is very similar to our case, when the defendant (the party which receives the offer) exhibits reference-dependent preferences. In contrast to Langlais’ model, with reference-dependent preferences a higher settlement offer also
affects the difference in payoffs and we also consider reference-dependent preferences on side of the party, which proposes the settlement offer.

Other behavioral extensions are for example studied by Farmer and Pecorino (2002). They consider Bebchuck’s screening model with both parties exhibiting self-serving bias. Both parties overestimate the probability to win the trial. They find that for the uninformed party it is never beneficial to exhibit a self-serving bias. The party makes a settlement offer which is too high for the informed party and hence increases the probability of trial. In the case of trial the actual probability to win the trial is lower than expected and the party would have preferred to settle the case out of court. For the informed party, who receives the offer, the self-serving bias might be beneficial. Due to the self-serving bias the uninformed party rejects settlement offers, which she would normally accept. Hence the uninformed party is in court too frequently. Since the informed party anticipate this behavior, she has to make more advantageous offers, for the informed party to accept. Hence the offers, the informed party receives, are more advantageous due to her self-serving bias.

Farmer and Pecorino (2004) extend the screening model, with the informed party exhibiting fairness preferences. The informed party is willing to pay some costs to be treated fair. This reduces the number of types which will accept a settlement offer and hence increases the probability of trial.

Apart from the context of pretrial settlement, Schumacher et al. (2016) consider reference-dependent preferences in a Nash-bargaining model. Before the Nash-bargaining stage, one party is informed about her bargaining power. The informed party can propose a settlement offer to the uninformed party, who exhibits reference-dependent preferences. This settlement offer signals the bargaining strength of the sender and influences the gain-loss utility of the receiver. Schumacher et al (2016) show that the receiver is able to extract a settlement offer which is above the equilibrium payoff from the Nash bargaining stage.

Our work also relates to the experimental literature about pretrial settlement. For example Korobkin and Guthrie (1998) find that lawyers seem to be less prone to loss aversion than students. However as Belton et al. (2014) suggest, this has to do with the framing of the problem. In Guthrie (1998) lawyers have to advice the litigating party and hence take the role of an actual lawyer, whereas in Belton et al. (2014) they take the role of a litigating party. In the latter case lawyers exhibit the same degree of loss aversion as non-lawyers. Zamir and Ritov (2010) compare the choice between contingent and fixed
fee arrangements under different framed cases. They argue that under fixed fee arrange-
ments the parties face a gamble between a win and a loss, since the plaintiff also has
to pay the lawyer in case of losing the trial. Under the contingent fee arrangement the
plaintiff pays nothing to the lawyer in case of losing the trial but gets a lower payoff in
case of winning. Hence she faces a pure positive gamble. They find that individuals prefer
the contingent fee arrangement even if the expected payoff from the fixed fee arrangement
is two to three times higher. They explain their results by loss aversion since individu-
als seem to be satisfied with lower expected payoff if they can avoid the probability of a
loss. Korobkin (2009) conducts an experiments, where two parties play a settlement game
against each other. He examines what kind of characteristics help the parties to achieve
a higher settlement outcome. He finds that parties who belief, that the other party has a
small reservation price are able to extract a higher payoff from the negotiations. A higher
target of extracting a certain settlement amount and Fairness considerations also increase
the payoff from the settlement negotiations.
Apart from the experiment conducted by Korobkin (2009), the above mentioned experi-
ments have in common that the decision maker is always the receptor of the settlement
offer. Hence there is no uncertainty and the decision to reject the settlement offer and go
to court takes the form of deciding between a fixed payment and a lottery. In Korobkin
(2009) there is a settlement stage where both parties indeed negotiate over the settlement
amount. However all experiments have in common that the settlement offer does not
influence the probability of winning or losing the trial, which will be one of the main
effects in our model.

3 The model

Following Bebchuck (1984) we assume that an uninformed plaintiff files suite against an
informed defendant.\footnote{In the following, we refer to the defendant as "he" and to the plaintiff as "she".}
The probability of winning the trial for the plaintiff is denoted by $p$ and is private information of the defendant.\footnote{Similar to Bebchuck (1984) this can be interpreted in a way, that in a tort case the defendant knows whether he was negligent or not.}
The plaintiff knows the distribution over the possible winning probabilities, $f(p)$, with the cumulative distribution function $F(p)$. 
We assume that \( p \) is distributed in the interval \([a, b]\), with \( 0 < a < b < 1 \). In the following we refer to \( p \) as the type of the defendant.

The plaintiff makes an settlement offer \( S \), which the defendant either accepts or rejects. In case he accepts the game ends and the payoff for the defendant is \(-S\) and for the plaintiff \( S \). If the defendant rejects the settlement offer we assume that the plaintiff always has a credible threat to bring the case to court. In this case a trial occurs, where the defendant and the plaintiff have to bear litigation costs of \( c_D \) and \( c_P \) respectively. We assume that the parties litigate under the American rule, such that each party has to bear her own litigation costs. The judgment award for the plaintiff is denoted by \( W \). The litigation costs and the judgment award are common knowledge.

We allow both parties to exhibit reference-dependent preferences as proposed by K˝oszegi and Rabin (2006, 2007). In K˝oszegi and Rabin (2007) an individual derives ”consumption utility” from consuming a consumption bundle \( k \) and ”gain-loss utility” from comparing this consumption bundle to a reference bundle \( r \). The utility of an individual \( i \) with reference-dependent preferences for a riskless outcome is given by \( u_i(k|r) = m_i(k) + \mu_i(k - r) \), with \( m_i(k) \) denoting consumption utility and \( \mu_i(k - r) \) the gain-loss utility of individual \( i \). The function \( \mu_i(k - r) \) corresponds to the ”value function” of Kahneman and Tversky (1979), with \( i = \{D, P\} \) describing gain-loss utility of the defendant and the plaintiff respectively. We adopt the assumption by K˝oszegi and Rabin (2006, 2007) and assume that \( \mu_i(k - r) \) is piecewise-linear, with \( \mu_i(x) = \eta_i x \) for \( x \geq 0 \) and \( \mu_i(x) = \eta_i \lambda_i x \) for \( x < 0 \), with \( \eta_i > 0 \) and \( \lambda_i > 1 \), \( \forall i \). The assumption that \( \lambda_i > 1 \) captures loss aversion and ensures that a loss is felt more strongly compared to an equal sized gain. For the consumption utility we assume that \( m_i(k) = k \). In K˝oszegi and Rabin (2007) the reference point is stochastic and is given by the lottery over all possible outcomes. In our case the reference lottery consists of the outcomes from settling the case out of court, winning the trial and losing the trial weighted with the expectations of the parties that these cases occur. It is assume that both parties have rational expectations about the outcomes and hence the expectation are just equal to the true probability that these cases occur. The overall gain-loss utility of the parties consists of the comparison of each outcome compared to each outcome of the reference lottery.

\(^{7}\)In the standard model this assumption is fulfilled for \( aW - c_P \geq 0 \). With reference-dependent preferences the choice of the plaintiff whether to go to court or drop the case after failed settlement negotiations will also depend on her gain-loss utility. We discuss the restriction on \( a \) further below.
Since the outcomes in the settlement stage and trial are uncertainty, each comparison is also weighted with the probability of its occurrence. Hence the overall utility is given by 

\[ U_i(F|G) = \int \int u_i(k|r)dG(r)dF(k), \]

with \( G(r) \) being the reference lottery and \( F(k) \) being the cumulative distribution function over the possible outcomes. The gain-loss utility then consists of a mixture of feelings from these comparisons. We denote the overall gain-loss utility of party \( i \) by 

\[ M_i(k-r|r) = \int \int \mu_i(k-r)dG(r)dF(k). \]

For the solution concept of the model we use the "choice-acclimating personal equilibrium" (CPE) developed by Kőszegi and Rabin (2007). In the CPE individuals take into account how their choices affect the reference lottery. This equilibrium concept is appropriate when individuals commit to their choice a long time before the outcome is realized. After making their choice individuals have time to adapt to the consequences of their choice and therefore take into account how their choice affects the reference points. Since settlement negotiations take a long time and both parties comply to a strategy of negotiating the settlement offer long before the actual settlement is reached, it seems reasonable that the actual settlement offer will influence the reference point of both parties. For the settlement offer to be a CPE the plaintiff maximizes her utility at each decision node. If the plaintiff expects to bring the suite to court during the settlement negotiations, she actually has to carry this through once settlement negotiations fail. Similar to Bebchuck’s model we abstract from the possibility that the plaintiff might not have a legal merit to take the case to court. This condition is satisfied for: 

\[ aW - cP - a(1 - a)\eta_P[\lambda_P - 1]W \geq 0. \]

The last term captures the gain-loss utility of the plaintiff from the trial process. Hence with reference-dependent preferences there has to be a larger expected payoff from trial compared to the benchmark model. In our model the strategy set of the plaintiff is the settlement offer \( S \). For the defendant, the strategy set consists of accepting and rejecting the settlement offer. The CPE is given by definition 1.

**Definition 1** Settlement offer \( S^* \) constitutes a CPE for:

\[ U_P(S^*|S^*) \geq U_P(\hat{S}|\hat{S}) \]

\[ \forall \hat{S}. \]
4 Results

We consider a plaintiff with reference-dependent preferences and a defendant without reference-dependent preferences. In the extensions we also consider reference-dependent preferences on the side of the defendant. The defendant accepts an offer if his costs from settling are lower or equal than his expected costs from trial, \( S \leq pW + c_D \), and rejects the offer otherwise. He is indifferent between accepting and rejecting the offer if

\[
p = \frac{S - c_D}{W}.
\]

Let \( q(S) \) be the type of the defendant who is indifferent between accepting and rejecting a settlement offer \( S \). Define \( q(S) \) by:

\[
q(S) \equiv \frac{S - c_D}{W}.
\]

By choosing a settlement offer \( S \) the plaintiff screens the defendant types with which she wants to litigate. The defendant accepts a settlement offer if \( p \geq q(S) \) and rejects the offer otherwise. Like in Bebchuck (1984) we will refer to \( q(S) \) as the "borderline type" of the defendant. The probability that the defendant accepts an offer \( S \) is given by \( 1 - F(q(S)) \) and the probability to reject an offer is given by \( F(q(S)) \).

The expected utility of the plaintiff is given by:

\[
U_P(S|S) = \left[ 1 - F(q(S)) \right] S + F(q(S)) \left[ -c_P + \pi(q(S))W \right] + M_P(S - r_P|S),
\]

with \( \pi(q(S)) = \int_{q(S)}^{\infty} x f(x) dx / F(q(S)) \) being the probability of winning the trial, conditional on the defendant rejecting the offer and \( M_P \) being the gain-loss utility of the plaintiff.

The plaintiff compares three potential outcomes against each other: the outcome if both parties agree to settle, the outcome if the defendant rejects the settlement offer and the plaintiff loses the trial and the outcome if the defendant rejects the settlement offer and the plaintiff wins the trial. Hence the gain-loss utility is given by equations (3) and (4).8

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8This resembles the case of a civilian filing suit against a firm. Since firms are normally represented by lawyers and are more often sued than civilians, it seems reasonable that it is the defendant who is less prone to loss aversion (see for example Korobkin and Guthrie (1994) or Belton et al. (2014)).

9In the discussion we discuss the case, when the plaintiff "narrow brackets" and hence does not think through all of the consequences of her choice. In our case "narrow bracketing" seems realistic if the parties feel the loss from a missed settlement right after the settlement negotiations but before trial occurs or when she expects to settle with a high probability, such that she does not expect to end up in court. Hence the plaintiff does not consider each trial outcome separately but compares the outcome of settling to the expected outcome of trial (on the matter how reference points adjust over time and how reference-dependent preferences relate to "narrow bracketing" see K˝ oszegi and Rabin (2009)).

10In the appendix we derive the gain-loss utility of the plaintiff in more detail. Note that there is
\[ M_P(S - r_P|S) = -l_P \left\{ F(q(S))^2 \pi(q(S)) [1 - \pi(q(S))] W + F(q(S) [1 - F(q(S))] \pi(q(S)) [W - c_P - S] + [1 - \pi(q(S))] [S - (-c_P)] \right\}, \] (3)

for \( S < W - c_P \) and

\[ M_P(S - r_P|S) = -l_P \left\{ F(q(S))^2 \pi(q(S)) [1 - \pi(q(S))] W + F(q(S) [1 - F(q(S))] [S - \pi(q(S))W - c_P]) \right\}, \] (4)

for \( S > W - c_P \), with \( l_P = \eta_P [\lambda_P - 1] \).

Depending on the level of the settlement amount \( S \), the gain-loss utility differs. For \( S < W - c_P \) the settlement offer is below the payoff from winning the trial. Hence winning the trial feels like a gain compared to settling out of court and losing the trial like a loss compared to settling out of court. For \( S > W - c_P \) the settlement offer exceeds the payoff from winning the trial for the plaintiff. In this case a rejection of the settlement offer feels like a loss irrespective of winning or losing the trial.

The first term of equations (3) and (4) gives the comparison of the payoffs from trial. The second term of (3) to (4) gives the comparison of the payoffs from settling out of court and going to court. The gain-loss utility for these events will differ in the levels of \( S \).

For \( S < W - c_P \) winning the trial yields a higher payoff than settling. The first term in the second line of (3) gives the loss sensation from the comparison of the payoffs from winning the trial and settling out of court and the second term in the second line gives the loss sensation from the comparison of the payoffs from losing the trial and settling out of court.

For \( S > W - c_P \) settling the case yields a higher payoff than going to court, irrespective of the plaintiff winning or losing the trial. The plaintiff is in the loss frame if the settlement offer is rejected. Hence she compares the payoff from settlement to the expected payoff of trial. The expected loss is given in the second line of equation (4).

To derive the choice-acclimating personal equilibrium, the plaintiff maximizes \( U_P(S|S) \) also the limiting case when \( S = W - c_P \) where the plaintiff is indifferent between winning the trial and settling. For this case the level of the gain-loss utility is just equal to the level of the gain-loss functions (3) and (4), if they would apply for \( S = W - c_P \). We therefore abstract from this case.
over $S$. The CPE gives the settlement offer which yields the highest utility for all gain-loss functions. We define the optimal settlement offer by $S_1^* \equiv \arg \max_S U_P(S|S)$ for $S < W - c_P$ and $S_2^* \equiv \arg \max_S U_P(S|S)$ for $S > W - c_P$. We assume that the utility functions are concave over the settlement levels. Note that it must not necessarily be the case, that $S_1^* < W - c_P$ or $S_2^* > W - c_P$. So it is not clear whether the optimal settlement amount falls in the interval for which the utility function applies. However as we show in the appendix, if the optimal settlement offer falls in the range for which the settlement offer actually applies, then the settlement offer constitutes the unique CPE.

**Lemma 1** If $S_1^* \in [c_D, W - c_P)$, then $S_1^*$ is the unique CPE. If $S_2^* \in (W - c_P, \infty)$, then $S_2^*$ is the unique CPE. $S^* = W - c_P$ is the unique CPE otherwise.

Proof, see appendix.

The proof follows a simple line of reasoning: we first assume that the utility functions with the different gain-loss functions apply over the whole settlement range. We then show that for $\hat{S} > (\langle W - c_P, U_P(\hat{S}|S < W - c_P) \rangle < \langle W - c_P, U_P(\hat{S}|S > W - c_P) \rangle$. The utility functions intersect at the point of $S = W - c_P$. Due to the assumption of strict concavity it follows that if the settlement amount $S_1^*$ falls into the interval $[c_D, W - c_P)$, then $S_1^*$ is unique the CPE (the same holds for $S_2^* \in (W - c_P, \infty)$). If the optimal settlement amounts fall in the range where the utility functions do not apply, than due to the concavity of the utility functions $S^* = W - c_P$ is the unique CPE.

Note that the settlement offer and the borderline type are linearly related. Since we are mainly interested in how reference-dependent preferences influence the likelihood of settlement, we will focus on the choice of the optimal borderline type in the remainder of the paper.

The results of lemma (1) carry over to the optimal level of $q(S)$. Since $S = q(S)W + c_D$ the condition for $S \geq W - c_P$ can be rewritten to $q(S) \geq \frac{W - c_P - c_P}{W}$. Define $q_1^*(S) \equiv \arg \max_{q(S)} U_P(q(S)|q(S))$ for $a \leq q(S) < \frac{W - c_P - c_P}{W}$ and $q_2^*(S) \equiv \arg \max_{q(S)} U_P(q(S)|q(S))$ for $b \geq q(S) > \frac{W - c_P - c_P}{W}$, then corollary (1) follows:

**Corollary 1** If $q_1^*(S) \in [a, \frac{W - c_P - c_P}{W}]$, then $q_1^*(S)$ is the unique CPE. If $q_2^*(S) \in (\frac{W - c_P - c_P}{W}, b]$ then $q_2^*(S)$ is the unique CPE. $q^*(S) = \frac{W - c_P - c_P}{W}$ is the unique CPE otherwise.

Figure (1) depicts the cases for different CPEs. The dotted lines give the segment of the utility functions where they do not apply. We denote $U_{P,1}$ as the utility function
for \( q(S) \in [a, \frac{W-c_D-c_P}{W}] \) and \( U_{P,2} \) for \( q(S) \in (\frac{W-c_D-c_P}{W}, b] \). The intersection of the utility functions is at \( \frac{W-c_D-c_P}{W} \). Which CPE applies depends largely on the difference between the judgment award \( W \) and the overall litigation costs \( c_D + c_P \) and on the degree of loss aversion \( l_P \). As we show in the comparative statics section, increasing \( l_P \) reduces the optimal borderline types. If the difference in the judgment award to the overall litigation costs is also large, the interval for which for which \( q_1^*(S) \) applies gets larger. Hence for a high degree of loss aversion and a high judgment award the CPE is \( q_1^*(S) \)\(^{11}\). Intuitively, the expected loss from going to court is large and hence the plaintiff chooses a low borderline type to settle out of court. Figure 1a depicts the case of \( q_1^* \) as the CPE. If the overall litigation costs takes a larger fraction of the judgment award, then the interval for which \( q_2^*(S) \) applies gets larger. A low degree of loss aversion increases the optimal borderline type. Since the consumption utility is more pronounced the utility functions get more similar to each other and the optimal borderline type is closer to the benchmark outcome. The case of \( q_2^*(S) \) as a CPE is depict in figure 1b. For the remainder of the paper we will analyze both cases.

To derive the optimal borderline type we plug in \( S = q(S)W + c_D \) into equation (2) and maximize over \( q(S) \). The condition for the optimal borderline type is given by equation (5):

\[
[1 - F(q(S))]W + M_P(q(S) - r_P|q(S)) = f(q(S))[c_D + c_P],
\]

with

\[
M_P(q(S) - r_P|q(S)) = -l_P \left\{ f(q(S)) \left[ 1 - F(q(S)) \right] \left[ 2q(S)(1 - q(S))W + (1 - 2q(S)) \left[ c_D + c_P \right] \right] \\
+ F(q(S)) \left[ 1 - 2\pi \right] \left[ 1 - F(q(S)) \right] W - f(q(S)) \left[ c_D + c_P \right] \right\},
\]

\(^{11}\)Tversky and Kahneman (1992) find that on average \( \lambda \approx 2.25 \). (see also Abdellaoui et al. (2007, 2008). For a discussion over the level of \( l_P \) see for example Herweg et al. (2015) or Schumacher et al. (2016).
for $q(S) \in [a, W - c_D - c_P/W)$ and

$$M'_P(q(S) - r_P | q(S)) = -l_P \left\{ f(q(S)) \left[ [1 - F(q(S))] [c_D + c_P] + 2F(q(S)) \pi (1 - q(S))W \right] + F(q(S)) \left[ [1 - F(q(S))] W - f(q(S)) [c_D + c_P] \right] \right\},$$

(7)

for $q(S) \in (W - c_D - c_P/W, b]$.

The effect of a higher borderline type on the consumption utility is given by condition (5) and is the same as in the benchmark model. The first term on the left hand side gives the marginal benefit of $q(S)$: a higher borderline type loses more often in trial and hence the plaintiff can extract a higher settlement amount. The right-hand side gives the marginal costs of $q(S)$: trial occurs more often, where the plaintiff incurs costs of $c_P$ and loses the litigation costs of the defendant $c_D$, which could have been extracted through settling the case.

The marginal effect of $q(S)$ on the gain-loss utility is given by equation (6) and (7).
First a higher borderline type increases the expected loss from the comparison of the trial outcomes. An increase in the borderline type increases the probability that trial occurs. Hence the plaintiff is more often in court, where she incurs the loss from comparing the expected payoffs from winning and losing the trial. A higher borderline type also increases the probability of winning the trial. In case of trial, the plaintiff expects to win more often and hence the likelihood of being in the loss frame increases. However the plaintiff loses less often and the probability of being in the loss frame decreases. These effects are ambiguous but outweighed by the former.

Second a higher borderline type affects the probability of feeling the loss from comparing the trial outcomes to the settlement outcome: A higher borderline type increases the probability that trial occurs, where the plaintiff incurs the expected loss from comparing the trial outcomes to the settlement outcome. But she expects an acceptance of the settlement offer less often and anticipates to be in trial more often. The former effect increases the likelihood of being in the loss frame, whereas the latter effect decreases it. For \( q(S) \in [a, \frac{W-cp-cp}{W}] \) the positive effect completely outweighs the the marginal effect of a higher borderline type on the likelihood of feeling the loss from the comparison of trial outcomes and is given by the second term in the second line of equation (6).

A higher borderline type also increases the probability of winning the trial. Hence in case of settlement, the plaintiff is more often in the loss-frame since she expects the higher payoff from winning the trial with a higher likelihood. In contrast in case of trial, the plaintiff loses less often and she experiences the loss from comparing the outcome from losing the trial to settling out of court less often. Combining these effects with the marginal effect of a higher borderline type on the probability that the settlement offer is rejected, gives the first line of equation (6).

Finally an increase in the borderline type increases the settlement amount and hence influences the expected loss from comparing the settlement outcome to the trial outcomes. This effect is ambiguous and given by the the first term in the second line of equation (6). In case of settlement the outcome from settling gets larger and hence the loss from settling compared to winning the trial gets smaller. In case of losing the trial, a higher settlement amount increases the payoff from the missed settlement opportunity and hence the loss from losing the trial compared to settling gets larger.

One can show that the first line of equation (6) is negative for \( q(S) \in [a, \frac{W-cp-cp}{W}] \).
The second line is just the condition for a risk-neutral plaintiff. Since we assumed a concave utility function, it follows that the marginal effect of $q(S)$ on the gain-loss utility is negative. For $q(S) \in (\frac{W - c_D - c_P}{W}, b]$ the effect of $q(S)$ on the probability that trial occurs and the probability that settlement is accepted is similar to the case of $q(S) \in [a, \frac{W - c_D - c_P}{W})$. The former effect increases the likelihood of being in the loss frame, whereas the latter effect decreases the likelihood of being in the loss frame. The positive effect cancels partly with the marginal effect of a higher borderline type on the probability of feeling the loss from comparing the trial outcomes and is given by the last term in the second line of equation (7). Since the settlement offer exceeds the outcome from winning the trial, as discussed above, the plaintiff compares the settlement outcome to the expected payoff of trial. An increase in the borderline type increases the settlement offer and hence increases the gap in outcomes between settling and trial. This increases the felt loss from missed settlement. A higher borderline type also increases the expected payoff from trial, since more weak cases go to court. Hence the expected outcome from going to court gets larger and the expected loss from missed settlement decreases. The positive effect cancels out and the negative effect is given by the first term in the second line of equation (7). The second line of equation (7) is just the condition for the optimal $q(S)$ for a risk-neutral plaintiff. Hence the marginal effect of $q(S)$ on the gain-loss utility is negative for $q(S) \in (\frac{W - c_D - c_P}{W}, b]$. Since there is a linear relation between the settlement amount and the borderline type it follows, that the settlement amount is also smaller compared to the benchmark model.

**Proposition 1** Reference-dependent preferences for the plaintiff reduce the optimal borderline type and the settlement demand of the plaintiff. Hence reference-dependent preferences for the plaintiff increase the probability of settlement.

Proof, see appendix.

5 Comparative statics.

We derive the effect of a higher judgment award $W$, higher costs of litigation for the plaintiff and defendant, $c_P$, $c_D$, and higher loss aversion on the part of the plaintiff on the
likelihood of settlement. We conduct the comparative statics for the optimal borderline type, $q^*(S)$. Totally differentiating equation (5) with respect to $W$ and $q(S)$ yields:

$$\frac{dq_1^*(S)}{dW} = -\left[1 - F(q(S))\right] \left[1 - l_P \left\{2f(q(S))q(S)[1 - q(S)] + F(q(S))[1 - 2\pi] \right\}\right],$$

and

$$\frac{dq_2^*(S)}{dW} = -\frac{1}{\partial^2 U_P/\partial q(S)^2} \left[1 - F(q(S))\right] - l_P F(q(S)) \left\{2f(q(S))\pi[1 - q(S)] + [1 - F(q(S))]\right\}. $$

A higher judgment award increases the payoff from winning the trial and hence the amount the plaintiff can extract from a settlement offer. The marginal effect of a higher borderline type on the settlement offer is also more pronounced. For $l_P = 0$ the standard result applies and a higher judgment award increases the optimal borderline type. For $q(S) \in [a, W - c_P - c_D W]$ a higher judgment award increases the payoff difference between trial and settlement and hence enforces the marginal effect of a higher borderline type on the probability of winning the trial. As discussed above this effect is in general ambiguous, but cancels partly such that only the negative effect prevails. This effect is given by the first term in curly brackets. In addition a higher judgment award enforces the marginal effect of a higher borderline type on the settlement amount and hence enforces the effect of a higher borderline type on the loss sensation from the comparison of payoffs between trial and settlement. As discussed above a higher settlement amount decreases the difference in payoffs between winning the trial and settling and increases the difference in payoffs between losing the trial and settling. A higher judgment award enforces both effects. This effect is given by the second term in the curly brackets of $\frac{dq_1^*(S)}{dW}$ and depends on the level of $\pi$. For $\pi > 0.5$ the former positive effect prevails and the overall effect is ambiguous. For $\pi \leq 0.5$ the negative effect prevails and the effect of a higher judgment decreases the optimal borderline type for a high degree of loss aversion.

For $q(S) \in (W - c_P c_D/W, b]$ a higher judgment award enforces the marginal effect of a higher borderline type on the comparison of trial outcomes, since the expected loss from trial increases. This effect is given by the first term in the curly brackets of $\frac{dq_1^*(S)}{dW}$. A higher judgment award also enforces the marginal effect of a higher borderline type on the payoff comparison from settling out of court and the expected payoff in trial. Since only the negative effect prevails, a higher judgment award increases the marginal costs from a

\[\text{We display the comparative statics regarding the settlement amount in the appendix.}\]
higher borderline type on the gain-loss utility for \( q(S) \in (\frac{W-c_P-c_D}{W}, b] \).

Reference-dependent preferences counterweight the effect of a higher judgment award on the optimal borderline type under the benchmark case. Intuitively a higher judgment award increases the difference in payoffs between winning and losing the trial and also between settling out of court and going to court. Hence the plaintiff tries to avoid this larger losses and rather settles out of court. As shown in the discussion theories of status quo reference points predict the same effects as the benchmark model. Empirical studies however show, that it is indeed unclear how a higher judgment award affects the likelihood of settlement.\(^{13}\)

We now turn to the effect of higher litigation costs on part of the plaintiff on the likelihood of settlement. The effect of higher \( c_P \) on the optimal borderline type of the plaintiff is given by:

\[
\frac{dq^*_1(S)}{dc_P} = -f(q(S)) \left[ -1 - l_P \left\{ [1 - F(q(S))] [1 - 2q(S)] - F(q(S)) [1 - 2\pi] \right\} \right],
\]

and

\[
\frac{dq^*_2(S)}{dc_P} = -f(q(S)) \left\{ -1 - l_P [1 - 2F(q(S))] \right\}.
\]

For \( l_P = 0 \) higher litigation costs of the plaintiff increase the costs from trial and hence increase the likelihood of settlement.

For \( l_P > 0 \) and for \( q(S) \in [a, \frac{W-c_P-c_D}{W}) \) higher litigation costs of the plaintiff decrease the difference in payoffs from winning the trial and settling and increases the difference in payoffs from losing the trial and settling. Hence higher litigation costs enforce the effect of a higher borderline type on the probability that settlement is rejected. This effect is given by the second term in the curly brackets. In addition higher litigation costs enforce the effect of a higher borderline type on the probability of winning the trial. This effect is given by the first term in the curly brackets. As discussed above both effects are ambiguous.

For \( q(S) \in (\frac{W-c_P-c_D}{W}, b] \) again higher litigation enforce the marginal effect of a higher borderline type on the probability that trial occurs. Since a higher borderline type on the one hand increases the probability of trial, but also decreases the expectation of settling, the effect of higher \( c_P \) on the marginal costs of the gain-loss utility is ambiguous and is

\(^{13}\)See for example Kessler and Rubinfeld (2007).
given by the second term of $\frac{dq^*(S)}{dc_P}$. The effect of higher litigation costs of the defendant, $c_D$, on the decision of the optimal borderline type $q^*(S)$ consist on similar effects:

$$\frac{dq^*_1(S)}{dc_D} = -f(q(S)) \left\{ -1 - l_P \left[ 1 - F(q(S)) \right] \left[ 1 - 2q(S) \right] - F(q(S)) \left[ 1 - 2\pi \right] \right\},$$

and

$$\frac{dq^*_2(S)}{dc_D} = -f(q(S)) \left\{ -1 - l_P \left[ 1 - 2F(q(S)) \right] \right\}.$$

The effect of $c_D$ on the optimal borderline type follows a similar line or reasoning as the effect of $c_P$. Higher litigation costs of the defendant allow the plaintiff to extract a higher settlement amount. Hence the payoff differences between settlement and trial increase in the same direction as for a larger $c_P$ and enforces the same marginal effects as for $c_P$.

Again these findings seem to better reflect the empirical findings, e.g. from Fournier and Zuehlke (1989), where higher litigation costs decrease the likelihood of settlement. As we show in the appendix and in the discussion, status quo reference points predict a higher likelihood of settlement for higher litigation costs of both parties.

The effects of higher loss aversion on the optimal borderline type is given by

$$\frac{dq^*_1(S)}{dl_P} = \frac{1}{\partial U_P^2} \left\{ f(q(S)) \left[ 1 - F(q(S)) \right] \left[ 2q(S)(1 - q(S))W + (1 - 2q(S))[c_D + c_P] \right] + F(q(S)) \left[ 1 - 2\pi \right] \left[ 1 - F(q(S)) \right] W - f(q(S)) \left[ c_D + c_P \right] \right\},$$

and

$$\frac{dq^*_2(S)}{dl_P} = \frac{1}{\partial U_P^2} \left\{ f(q(S)) \left[ 1 - F(q(S)) \right] \left[ c_D + c_P \right] + 2F(q(S))\pi(1 - q(S))W \right\}.$$

Higher $l_P$ increases the effect of $q(S)$ on the gain-loss utility. From proposition [1] we know that the marginal effect of a higher borderline type on the gain-loss utility is
negative. Therefore a higher degree of loss aversion decreases the optimal borderline type and hence increases the likelihood of settlement. Proposition 2 summarizes the results.

**Proposition 2** For \( l_P = 0 \) a higher judgment award decreases the likelihood of settlement. For \( l_P > 0 \) and \( q_1^*(S) \) a higher judgment award increases the likelihood of settlement for low probability of winning the trial and high degree of loss aversion and has an ambiguous effect otherwise. For \( q_2^*(S) \) a higher judgment award increase the likelihood of settlement for sufficiently high \( l_P \) and decrease it otherwise.

For \( l_P = 0 \), higher litigation costs of the defendant or the plaintiff increases the likelihood of settlement. For \( l_P > 0 \) and \( q_1^*(S) \) the effect of higher litigation costs on the likelihood of settlement is ambiguous. For \( q_2^*(S) \) higher litigation costs of the defendant or plaintiff increase the likelihood of settlement for high loss aversion and high probability of accepting the settlement offer and decrease the likelihood of settlement otherwise.

A higher degree of loss aversion decreases the likelihood of settlement.

### 6 Extensions

We consider several extensions. First we analyze the likelihood of settlement under the British rule and compare the results to the case of the American rule. We then allow for reference-dependent preferences for both parties and check how reference-dependent preferences for the defendant influence the likelihood of settlement. Finally we show how reference-dependent preferences influence the incentive to gather and voluntarily disclose information.

#### 6.1 British rule.

Under the British rule the party which loses the trial has to bear the whole litigation costs. Hence the parties receive a larger gain in case of winning and a higher loss in case of losing the trial.\(^{15}\)

For \( l_P = 0 \) the standard result from Bebchuck (1984) applies: the marginal benefit from a higher borderline type on the settlement amount is more pronounced under the British rule.\(^{15}\)

\(^{15}\)Under the British rule, the defendant either pays 0 if he wins or the overall costs of trial \(-W - c_P - c_D\) if he loses. The plaintiff either wins \( W \) or loses \(-c_P - c_D\).
rule, since the costs from losing the trial are larger. Hence a marginal increase in the borderline type allows the plaintiff to extract a higher settlement amount than under the American rule and the likelihood of settlement decreases compared to the American rule. For \( l_p > 0 \) the expected loss from the gain-loss function is larger under the British rule. The difference in payoffs between winning and losing the trial is higher under the British rule than under the American rule and hence going to court induces a larger expected loss under the British rule. The differences in payoffs between settling the case and going to court are also larger for the British rule. Winning the trial or settling induce no litigation costs, whereas for losing the trial the plaintiff has to pay the full litigation costs. This again increases the costs from the gain-loss utility under the British rule compared to the American rule.

For the comparison of the likelihood of settlement for the different cost rules, we compare the optimal borderline types for the cases, when the settlement offer is below and above the payoff of winning the trial separately. If the settlement offer is below the payoff from winning the trial, first note that the marginal effect of a higher borderline type on the expected loss from the comparison of trial outcomes cancels out. However the differences in payoffs between winning the trial and settling and losing the trial and settling are larger under the British rule. Hence the marginal effect of a higher borderline type on the probability that settlement is accepted and on the probability of winning the trial is more pronounced under the British rule. As discussed above the marginal effect of \( q(S) \) on the settlement offer and hence on the payoff differences between winning the trial and settlement and losing the trial and settlement are also more pronounced under the British rule. Again this effect depends on the level of \( \pi \).

For the case when the settlement offer is above the payoff from winning the trial again the gap between winning and losing the trial is larger under the British rule. A higher borderline type increases the probability that the case goes to court and hence increases the probability to exhibit this larger loss sensation. In addition under the British rule the effect of a higher borderline type on the settlement amount is more pronounced than under the American rule. Hence the effect of a higher borderline type on the difference in payoffs between settling and going to court is more pronounced under the British rule compared to the American rule. This again increases the marginal costs of a higher borderline type on the gain-loss utility under the British rule compared to the American
rule. Adding up, the marginal effects from the borderline type on the gain-loss utility are more pronounced under the British rule and counteract the larger marginal benefit for the consumption utility. Which effect prevails depends on the degree of loss aversion. These findings are also consistent with the empirical literature, e.g. by Hughes and Snyder (1995), which suggest a higher likelihood of settlement under the British rule compared to the American rule. Proposition 3 summarizes the results.

**Proposition 3** For $l_P = 0$, the probability of settlement is lower under the British rule than under the American rule.

For $l_P > 0$ and the comparison of $q_{AR,1}^*$ to $q_{BR,1}^*$ the likelihood of settlement is higher under the British rule than under the American rule for a high degree of loss aversion and a low probability of winning the trial and ambiguous otherwise.

For $l_P > 0$ and the comparison of $q_{AR,2}^*$ to $q_{BR,2}^*$ the likelihood of settlement is higher under the British rule than under the American rule for a high degree of loss aversion.

Proof, see appendix.

### 6.2 Defendant with reference-dependent preferences.

We now add reference-dependent preferences for the defendant. In the settlement stage there is no uncertainty regarding the settlement offer the plaintiff will propose to the defendant. Hence the defendant suffers no loss from an acceptance or rejection of the settlement offer. The outcome of trial is however uncertain. The defendant compares the outcome of winning the trial to the outcome of losing the trial. We again assume that the American rule applies. The gain-loss utility of the defendant then amounts to:

$$M_D(S - r|S) = -l_D p(1 - p)W,$$

with $l_D = \eta_D[\lambda_D - 1]$.

The expected costs for a defendant of type $p$ from trial is given by:

$$U_D = -pW - c_D - p(1 - p)l_D W.$$

The settlement amount for which a defendant of type $q(S)$ is indifferent between accepting and rejecting the settlement offer is given by:

$$S = q(S)W + c_D + q(S)(1 - q(S))l_D W. \quad (8)$$

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Note that for a high degree of loss aversion the plaintiff is able to extract a settlement offer which lies above the sure costs of the defendant from trial. We rule out such settlement offers, through parameter restrictions on the level of loss aversion and on the highest possible type $b$. This also ensures that there is a unique borderline type and this borderline type always exists. Under assumption $\frac{1}{b} > l_D$ the highest possible settlement amount the plaintiff might demand from the defendant is $\bar{S} = W + c_P$ and there exists exactly one borderline type $16$

**Assumption 1** $\frac{1}{b} > l_D$.

Solving condition (8) for $q(S)$ yields:

$$q(S) = 1 + \frac{l_D}{2l_D} - \sqrt{\left[1 + \frac{l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}}. \quad (9)$$

The borderline type of a defendant with reference-dependent preferences is lower than the borderline type of a defendant without reference-dependent preferences for any level of $S$.

**Lemma 2** Under assumption $\frac{1}{b} > l_D$, there exists a unique borderline type $q(S)$, for $S \in [c_D, \bar{S}]$. The unique borderline type of the defendant is given by equation $\frac{1}{b} > l_D$.

Proof, see appendix.

We now derive the optimal borderline type if the defendant and the plaintiff exhibit reference-dependent preferences. The optimal settlement offer and the optimal borderline type are no longer linearly related. We restrict our attention to the optimal borderline type, since this determines the likelihood of settlement.

The expected utility of the plaintiff is given by:

$$U_P(S|S) = \left[1 - F(q(S))\right]S + F(q(S))\left[-c_P + \pi W\right] + M_P(S - r|S).$$

Plugging in condition (8) and maximizing over $q(S)$ yields the condition for the optimal borderline type:

$16$Assumption $\frac{1}{b} > l_D$ is similar to the "no dominance of gain-loss utility" assumption imposed by Herweg et al. (2010), who assume that $l_i \leq 1$. This assumption ensures that the weight on the consumption utility is more pronounced than on the gain-loss utility. Note that our assumption is weaker, since for $b < 1$ the weight on the gain-loss utility might exceed the weight on the consumption utility.
\[
[1 - F(q(S))] \left[ 1 + (1 - 2q(S))l_D \right] W + M'_P(q(S) - r_P|q(S)) = f(q(S)) \left[ c_D + c_P + q(S)(1 - q(S))l_D W \right],
\]

Since the marginal effect of a higher borderline type on reference-dependent preferences of the defendant are the same for the consumption and the gain-loss utility we display the marginal effect of a higher borderline type on the gain-loss utility in the appendix and give only the intuition.

We first consider the effect of reference-dependent preferences on the consumption utility of the plaintiff (equation (10)). Reference-dependent preferences for the defendant increase the costs of missed settlement, since the plaintiff could have extracted a higher settlement amount compared to a defendant without reference-dependent preferences. The marginal effect of a higher borderline type on the settlement demand is however ambiguous: On the one hand a higher borderline type increases the probability of losing the trial for the defendant. Hence the defendant is in the loss frame more often and his costs increase. This allows the plaintiff to extract a higher settlement amount. On the other hand a higher borderline type decreases the probability of winning the trial for the defendant. Therefore the defendant expects to lose more often and he is less often in the loss frame. This in turn decreases the settlement amount the plaintiff can extract. The latter effect prevails for \( q(S) > 0.5 \). Hence for \( l_P = 0, l_D > 0 \) and \( q(S) \geq 0.5 \) reference-dependent preferences for the defendant decreases the optimal borderline type compared to the benchmark case. Reference-dependent preferences of the defendant have an ambiguous effect otherwise.

For \( l_P > 0 \) these two effects also influence the marginal effect of a higher borderline type on the gain-loss utility of the plaintiff: First reference-dependent preferences of the defendant increase the settlement amount compared to the case of a defendant without reference-dependent preferences. Therefore the difference in outcomes between settling and going to court gets larger for a defendant with reference-dependent preferences. This enforces the marginal effects of a higher borderline type on the probability that settlement is rejected and on the probability of winning the trial. As shown above the former effect cancels with the negative effect of a higher borderline type on the comparison of trial outcomes. The remaining positive effect is enforced through reference-dependent preference of the plaintiff. The latter effect is negative and also enforced through reference-dependent
preferences of the plaintiff. Comparing these effects to the case of a defendant without reference-dependent preferences yields ambiguous results. Second the marginal effect of a higher borderline type on the settlement amount is ambiguous for a defendant with reference-dependent preferences. As discussed above, how this effect influence the optimal borderline type depends on the level of $q(S)$.

**Corollary 2** For $l_P = 0$ reference-dependent preferences for the defendant decrease the optimal borderline type for $q(S) \geq 0.5$ compared to the case of a defendant without reference-dependent preferences. The comparison is ambiguous otherwise. For $l_P > 0$ the comparison is ambiguous.

### 6.3 Information research.

We now show how reference-dependent loss aversion affects the choice of information research and voluntary information disclosure for both parties. We therefore use the model of Farmer and Pecorino (2005), with the information structure described above. In the first stage, the defendant can engage in voluntary disclosure of his type for costs of $C^V_D$, to signal his type to the plaintiff. We assume that if he chooses to signal his type, the plaintiff learns his type $p$ with certainty. If the defendant decides not to reveal his type, the plaintiff can decide to gather information about the defendant’s type to costs of $C^I_P$. If she decides to engage in information searching, she learns with certainty the defendant’s type.

Let $S^*$ be the utility maximizing settlement offer of the plaintiff. If the plaintiff decides not to engage in information research his utility is given by:

$$U^NI_P = [1 - F(q(S^*))]S^* + F(q(S^*))\left[ -c_P + \pi(q(S^*))W \right] + M_P(S^* - r|S^*)$$

with $M_P(S^* - r|S^*)$ either given by equation (3) or (4) and $S^*$ given by (8).\(^{17}\) The superscript $NI$ denotes the 'no information' state. If the plaintiff decides to gather information and learns the plaintiff’s type then she extracts the costs from going to court for the defendant of type $p$. In this case the expected utility amounts to:

$$U^I_P = \int_a^b \left[ xW + c_D + x(1 - x)l_DW \right] f(x)dx - C^I_P,$$

\(^{17}\)For the analysis of the information research, the actual level of the settlement amount does not matter. We therefore abstract from the two different cases and denote the optimal settlement amount by $S^*$. 

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with the superscript $I$ denoting the state where information was gathered or revealed.

Plugging in equation (8) for $S^{*}$ and comparing $U^{I}_{P}$ with $U^{NI}_{P}$, gives the condition for $C^{I}_{P}$ under which the plaintiff engages in information seeking. The plaintiff engages in information seeking if:

$$
\int_{a}^{b} q(S^{*}) \left[ x + x(1 - x)l_{D} - [q(S^{*}) + q(S^{*})(1 - q(S^{*}))l_{D}] \right] W_{f}(x) dx 
+ l_{D} W \int_{a}^{q(S^{*})} x(1 - x)f(x) dx + F(q(S^{*}))[c_{D} + c_{P}] - M_{P}(S^{*} - r|S^{*}) \geq C^{I}_{P}.
$$

(11)

Similar to Farmer and Pecorino (2005) the left hand side of condition (11) gives the benefit of information research. Through discovery, the plaintiff can extract the costs from going to court from each defendant type, compared to the uninformed case, where she only extracts the costs of the borderline type $q(S^{*})$. This benefit is captured in the first two terms of condition (11). Reference-dependent preferences on part of the defendant boosts this effect, since the plaintiff can extract a higher surplus from the defendants. The third term gives the saving of litigation costs through settling out of court. Through discovery there is no uncertainty and hence the plaintiff has no costs through her gain-loss utility. It follows that reference-dependent preferences on the part of the defendant and plaintiff, respectively, increase the incentive for the plaintiff to engage in information research.

Does the the defendant have an incentive to voluntarily disclose his type in the first stage? If the defendant reveals his type in the first stage, the plaintiff will offer the settlement amount

$$
S = pW + c_{D} + p(1 - p)l_{D}W
$$

which the defendant accepts. The utility of the defendant in this case is:

$$
U^{V}_{D} = -pW - c_{D} - p(1 - p)l_{D}W - C^{V}_{D}.
$$

with the superscript $V$ denoting voluntarily information disclosure. If the defendant does not voluntarily disclose his type but the plaintiff engages in information research, the plaintiff again sets the settlement amount to extract the costs of type $p$ from going to court. Hence the utility of the defendant in this case is:

$$
U^{I}_{D} = -pW - c_{D} - p(1 - p)l_{D}W.
$$

If there is no information disclosure, the defendant does not accept the settlement offer for $p < q(S^{*})$. Trial occurs and the defendant’s utility amounts to:

$$
U^{NI,T}_{D} = -pW - c_{D} - p(1 - p)l_{D}W.
$$
with the superscript denoting, ‘no information’ and trial. If \( p > q(S^*) \), the defendant accepts the settlement offer and his utility is given by:

\[
U_{D}^{NI,S} = -q(S^*)W - c_D - q(S^*)(1 - q(S^*))l_D W.
\]

with the superscript denoting, ‘no information’ and settlement. Clearly, the utility of the defendant is larger if he chooses not to voluntarily reveal his type. Hence like in Farmer and Pecorino (2005) the informed party has no incentive to voluntarily reveal his type.

**Proposition 4** Loss aversion on part of the defendant and the plaintiff increase the incentive for the plaintiff to engage in information research. A loss averse defendant has no incentive to voluntarily disclose his information.

7 Discussion.

In this section we discuss potential different reference points. We first consider the case when the plaintiff narrow brackets. We then discuss reference points as the wealth before the accident or settlement negotiation.

7.1 Narrow bracketing plaintiff.

We have shown that reference-dependent preferences for the plaintiff unambiguously increase the likelihood of settlement. However other forms of reference point formation might be possible. Although we model the process of settlement negotiations and the subsequent trial process as a one-shot game, in reality it might take up to several months before trial actually occurs. Therefore it might seem more plausible to assume that parties feel the loss from a missed settlement opportunity after the settlement negotiations but before they go to court. In this case parties do not think through the whole trial process, but rather take the expected outcome of trial as their reference point.\(^{18}\) In this case the utility of the plaintiff is given by:

\[
U_P(S|S) = \left[1 - F(q(S))\right]S + F(q(S))\left[-c_P + \pi W\right] + M_P(S - r|S)
\]

\(^{18}\)We think that the reference lottery which we discussed in the previous section best fits the model of Kőszegi and Rabin (2007, 2009), when the parties thinks through the implications of their strategy choices. The case which we discuss here refers to “narrow bracketing”, where individuals do not fully consider the outcomes and implications of their choices. As Kőszegi and Rabin (2009) point out for a multi-period game, different forms of reference points apply. In this section we display one possibility. For a discussion over different reference lotteries see the online appendix of Kőszegi and Rabin (2009).
with

\[ M_P(S - r_P|S) = -l_P \left\{ F(q(S)) \left[ 1 - F(q(S)) \right] \left[ S - (\pi W - c_P) \right] \right\}. \]

(12)

The plaintiff compares the outcome from settling to the expected outcome of trial. The plaintiff "narrow brackets" since she considers the settlement stage and the trial process separately and hence does not think through the whole trial process. She therefore considers only the expected outcome of trial and not each potential trial outcome separately. Since the settlement offer, the plaintiff proposes is always larger than the expected outcome of trial, a rejection of the settlement offer feels like a loss and equation (12) follows.

The gain-loss utility of the plaintiff is similar to the case discussed above when the plaintiff offers a settlement amount which lies above the payoff from winning the trial. In the case at hand however she disregards the comparison of payoffs from winning and losing the trial.

When parties feel the loss after settlement negotiations but before trial, there is no uncertainty for the defendant and hence the gain-loss utility of the defendant amounts to 0. The defendant knows his type \( p \) and the settlement offer the plaintiff will propose. Hence he knows with certainty whether he accepts the offer or not. In case of rejection he also knows the expected payoff from trial and reference-dependent preferences on part of the defendant do not play a role.

The marginal effect of a higher borderline type on the consumption utility is the same as already discussed above. We therefore focus on the marginal effect of \( q(S) \) on the gain-loss utility:

\[ M'_P(q(S) - r_P|q(S)) = -l_P \left\{ f(q(S)) \left[ 1 - F(q(S)) \right] \left[ c_D + c_P - F(q(S))[q(S) - \pi]W \right] \right\}. \]

(13)

Similar to the case described above a higher borderline type increases the probability that the settlement offer is rejected and decreases the probability that the settlement offer is accepted. The former effect increases the costs from the gain-loss utility whereas the latter effect decreases the costs. In addition a higher borderline type increases the settlement amount and hence increases the difference in payoffs from settling compared to trial. A higher borderline type also increases the expected payoff from trial and hence decreases
the costs. This latter effect cancels with the negative marginal effect of a higher borderline type on the probability that the settlement offer is rejected. However the positive effect is not completely outweighed by the negative effects, since the negative effect of $q(S)$ on the comparison of winning and losing the trial is not present in this case. Therefore the overall sign of equation (13) is ambiguous.

**Proposition 5** If the reference point is the expected payoff of trial, the effect of reference-dependent preferences on the likelihood of settlement are ambiguous.

### 7.2 Status quo reference points.

We now shortly turn to status quo reference points. Studies of Korobkin and Guthrie (1994, 1998) find that parties perceive the wealth before the accident as the reference point, whereas studies of e.g. Rachlinski (1996) find that parties have a reference point of 0 when engaging in pretrial negotiations. For the former case the plaintiff is in the loss frame in case of trial, since, due to litigation costs, the full level of wealth cannot be restored. If the settlement offer is below the reference point, she is also in the loss frame in case of settlement. Hence the reference point is just equal to a constant and the marginal effects of a higher borderline type are the same as in the benchmark case. Hence loss aversion does not affect the likelihood of settlement and the comparative static results are the same as in the benchmark case. In the appendix we also give the case, when the settlement offer is above the reference point. In this case settling feels like a gain. Loss aversion decrease the optimal borderline type but the comparative static results remain the same.

If parties already adapted to the loss when engaging in settlement negotiations, the reference point amounts to 0. For settling the case out of court and winning the trial she is in the gain frame, but she is in the loss frame if she loses the trial. Hence the marginal costs of a higher borderline type on the case of trial is more pronounced and the optimal borderline type is lower than in the benchmark case. Higher litigation costs and judgment awards affect the marginal costs and benefits of a higher borderline type in the same direct as in the benchmark case. Hence the comparative static results do not change compared to the benchmark case.

In the case when the uninformed party makes the settlement offer, loss aversion with status quo reference points cannot explain the empirical findings regarding the effect of
higher litigation costs or judgment awards on the likelihood of settlement.

**Proposition 6** Status quo reference points decrease or have no effect on the likelihood of settlement. Higher litigation costs increase the likelihood of settlement and higher judgment award decreases the likelihood of settlement.

Proof see appendix.

8 Conclusion.

We have shown that reference-dependent preferences for the plaintiff decrease the likelihood of settlement in the model of pretrial bargaining of Bebchuck (1984). For the defendant, the effect of reference-dependent preferences on the likelihood of settlement is ambiguous and depends on the level of \( q(S) \). We also showed that reference-dependent preferences better explain empirical findings about the effect of higher litigation costs or judgment awards on the likelihood of settlement than other models of loss aversion. Also reference-dependent preferences can explain empirical findings for which the likelihood is larger under the British rule compared to the American rule, if the degree of loss aversion is sufficiently high. The reason for this is that under the British rule, the gap between winning and losing the trial and between settling the case and going to trial is larger. Therefore the expected loss from trial is larger compared to the American rule and parties avoid this expected loss by settling out of court. So in general it seems that reference-dependent preferences as proposed by Kőszegi and Rabin (2007) can explain empirical findings better compared to the widely used models with a reference-point as the status quo before the accident or of 0.

Regarding the experimental findings over loss aversion in the lab, it should be noted that these results suggest that parties must have some sort of forward looking reference point, if one wants to explain behavior of individuals in pretrial settlement negotiations with loss aversion. This was also already pointed out by Korobkin (2002, 2009), where the target to extract a certain settlement amount out of the trial process might also act as an reference point. Clearly further evidence is needed to distinguish better under which condition the different reference points apply.

Other extensions might concern the information structure of the parties. In the simplified model we discussed, only the plaintiff faces uncertainty over the probability of
winning the trial. However other information structures, like for example the one discussed by Reinganum and Wilde (1986), where the party who receives the settlement offer is the uninformed part, might yield different interesting results when applied to reference-dependent preferences.

Clearly a more realistic model would also incorporate different stages for the settlement negotiations. In our model settlement negotiations take the form of a take-it-or-leave-it offer. For settlement negotiations with different stages, the model of Kőszegi and Rabin (2009) is appropriate where parties get gain-loss utility from a change in their beliefs about future consumption. A rejection or offer of a new settlement amount contains different information and influences the gain-loss utility of the plaintiff and defendant. How loss aversion affects the outcome in this case is left for future research.
Appendix

Derivation of the different gain-loss utilities of the plaintiff.

To give an idea of reference-dependent preferences in the context of pretrial settlement consider equation (A.1). For representational matters we denote \( \hat{F}(q(S)) \) as the belief of the plaintiff over the probability that the defendant rejects the offers and \( \hat{\pi}(q(S)) \) as the belief of the plaintiff that she will win the trial, conditional on the defendant rejecting the offer (clearly do to rational expectations it follows that \( \hat{F}(q(S)) = F(q(S)) \) and \( \hat{\pi}(q(S)) = \pi(q(S)) \)). Then the gain-loss utility for \( S < W - c_P \) is given by:

\[
M_P(S - r | S) = \hat{F}(q(S))\hat{\pi}(q(S))\eta_P \left\{ F(q(S))\pi(q(S)) \left[ -c_p + W - (-c_p + W) \right] \right. \\
+ F(q(S)) \left[ 1 - \pi(q(S)) \right] \lambda_P \left[ -c_p - (-c_p + W) \right] \\
+ \left[ 1 - F(q(S)) \right] \lambda_P \left[ S - (-c_p + W) \right] \right\} \\
+ \hat{F}(q(S)) \left[ 1 - \hat{\pi}(q(S)) \right] \eta_P \left\{ F(q(S))\pi(q(S)) \left[ -c_p + W - (-c_p) \right] \right. \\
+ F(q(S)) \left[ 1 - \pi(q(S)) \right] \left[ -c_p - (-c_p) \right] \\
+ \left[ 1 - F(q(S)) \right] \left[ S - (-c_p) \right] \right\} \\
+ \left[ 1 - \hat{F}(q(S)) \right] \eta_P \left\{ F(q(S))\pi(q(S)) \left[ -c_p + W - S \right] \right. \\
+ F(q(S)) \left[ 1 - \pi(q(S)) \right] \lambda_P \left[ -c_p - S \right] \\
+ \left[ 1 - F(q(S)) \right] \left[ S - S \right] \right\}.
\]

(A.1)

In the first three lines of equation (A.1) the plaintiff expects a rejection of the settlement offer and to win the trial. The reference outcome is hence given by the payoff of winning the trial: \(-c_p + W\). The probability with which the plaintiff expects this outcome is given by \( \hat{F}(q(S))\hat{\pi}(q(S)) \). The terms in the curly brackets depict the comparison for each possible outcome compared to the reference outcome. The plaintiff is in the loss frame if she loses the trial and in case of settlement, since she expected to win and \( S < W - c_P \). The former case is depicted in the second line and the latter in the third line of equation (A.1).

In lines four to six the plaintiff expects the settlement offer to be rejected and to lose the trial. Therefore the reference outcome is \(-c_p\). The plaintiff expects this outcome with probability \( \hat{F}(q(S))(1 - \hat{\pi}(q(S))) \). Here for all comparison of outcomes the plaintiff is in the gain frame.
The last three lines give the case, when the plaintiff expects an acceptance of the settlement offer, which occurs with probability \(1 - \hat{F}(q(S))\). In this case the reference point is \(S\). The plaintiff is in the loss frame if she loses the trial and in the gain frame for winning the trial.

To derive equation (3) we make use of the fact, that the plaintiff exhibits rational expectations \((\hat{F}(q(S)) = F(q(S)))\) and \(\hat{\pi}(q(S)) = \pi(q(S)))\). Rearranging and simplifying equation (A.1) gives equation (3). The gain-loss utility for \(S > W - c_P\) is derived in a similar way.

**Proof of lemma 7**

Since the settlement amount \(S\) and the borderline type \(q(S)\) are linearly related the proof carries over to the optimal borderline type and corollary 1.

To see in which range the optimal settlement amount falls, consider first the utility functions and the different gain-loss functions of the plaintiff in the different settlement ranges. We define \(U_{P,1}\) as the utility function for \(S < W - c_P\) and \(U_{P,2}\) for \(S > W - c_P\). Rewriting the utility functions yields:

\[
U_{P,1}(S|S) = [1 - F(q(S))]S + F(q(S))\left[-c_P + \pi(q(S))W\right] - l_PF(q(S))\left(F(q(S))\pi(q(S))[1 - \pi(q(S))]W + [1 - F(q(S))][S + c_P] - [1 - F(q(S))]\pi(q(S))]W\right],
\]

and

\[
U_{P,2}(S|S) = [1 - F(q(S))]S + F(q(S))\left[-c_P + \pi(q(S))W\right] - l_PF(q(S))*\left(F(q(S))\pi(q(S))[1 - \pi(q(S))]W + [1 - F(q(S))][S + c_P] - [1 - F(q(S))]\pi(q(S))]W\right].
\]

It is not necessarily the case that the optimal settlement amount falls in the interval for which the utility function applies. We therefore assume that the utility functions hold over the full interval of \(S\) and compare the utility levels for a given \(S\). We compare the utility functions \(U_{P,1}\) and \(U_{P,2}\) for given \(S = \hat{S}\). It follows that:

\[
U_{P,1}(\hat{S}|S) \geq U_{P,2}(\hat{S}|S)
\]

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\[
[1 - F(q(\hat{S})))|\hat{S} + F(q(\hat{S}))] - c_P + \pi(q(\hat{S}))W\right] - l_P F(q(\hat{S}))^*\] \\
\left\{ F(q(\hat{S}))\pi(q(\hat{S}))[1 - \pi(q(\hat{S}))]W + [1 - F(q(\hat{S}))]|\hat{S} + c_P] - [1 - F(q(\hat{S}))]\pi(q(\hat{S}))W\right\} \geq \] \\
[1 - F(q(\hat{S})))|\hat{S} + F(q(\hat{S}))] - c_P + \pi(q(\hat{S}))W\right] - l_P F(q(\hat{S}))^*\] \\
\left\{ F(q(\hat{S}))\pi(q(\hat{S}))[1 - \pi(q(\hat{S}))]W\right\}.
\]

Simplifying, yields:

\[ [1 - F(q(\hat{S})))\pi(q(\hat{S}))W \geq [1 - F(q(\hat{S})))\pi(q(\hat{S}))\left[2|\hat{S} + c_P] - W\right]. \]

Rearranging yields: \(U_{P,1}(\hat{S}|S) \geq U_{P,2}(\hat{S}|S)\) if \(\hat{S} \geq W - c_P\).

Note however, that \(U_{P,1}(S|S)\) applies for \(S < W - c_P\) and \(U_{P,2}(S|S)\) for \(S > W - c_P\). This suggests, that utility function \(U_{P,1}\) yields higher utility in the range where \(U_{P,2}\) applies and vice versa. The utility functions intersect at the point of \(\hat{S} = W - c_P\). Intuitively for \(U_{P,1}(S|S)\) it is assumed that \(S < W - c_P\) and hence, the comparison of payoffs from settlement and winning the trial are weighted with \(\lambda_P > 1\). For the range of \(S > W - c_P\) these comparison get positive but negative for \(S < W - c_P\). Therefore is is clear, that the utility functions yield higher utility where they do not apply. Note that for high \(l_P\) this difference get more pronounced and the utility functions get more disparate.

Define \(S_2^* \equiv \arg\max_S U_{P,2}\). It follows that \(U_{P,2}(S_2^*|S) > U_{P,2}(\hat{S}|S), \forall \hat{S}\). Assume that \(S_2^* > W - c_P\). From above it follows that \(U_{P,1}(S_2^*|S) > U_{P,2}(S_2^*|S)\). However \(U_{P,1}\) does not apply for \(S > W - c_P\). From above it also follows that \(U_{P,2}(\hat{S}|S) > U_{P,1}(\hat{S}|S)\) for \(W - c_P > \hat{S}\). Therefore it has to hold that \(U_{P,2}(S_2^*|S) > U_{P,2}(\hat{S}|S) > U_{P,1}(\hat{S}|S)\) for \(W - c_P > \hat{S}\). Therefore under \(S_2^* > W - c_P\), \(S_2^*\) constitutes the CPE. If \(S_2^* > W - c_P\) it follows that \(S_1^* > W - c_P\). Since \(U_{P,1}\) does not apply for \(S > W - c_P\) and the concavity of the utility functions it follows that \(S_2^*\) is the unique CPE. The same line of reasoning applies for \(S_1^* \equiv \arg\max_S U_{P,1}\) and \(S_1^* < W - c_P\).

We now proof that if \(S_1^* \in (W - c_P, \infty)\) and \(S_2^* \in [0, W - c_P)\) then \(S^* = W - c_P\) is the unique CPE. For \(S^* = W - c_P\) the utility function amounts to:

\[
U_{P,3} = [1 - F(q(S))]S + F(q(S))\left[ - c_P + \pi(q(S))W\right] - l_P F(q(S))^* \\
\left\{ F(q(S))\pi(q(S))[1 - \pi(q(S))]W + [1 - F(q(S))]|S + c_P] - [1 - F(q(S))]\pi(q(S))[S + c_P]\right\}.
\]
Comparing $U_{P,3}$ to $U_{P,1}$ and $U_{P,2}$ shows that for $S = W - c_P$, $U_{P,3} = U_{P,1} = U_{P,2}$. From the strict concavity of the utility function it follows that if $S^*_1 \in (W - c_P, \infty)$ and $S^*_2 \in [0, W - c_P)$, $U_{P,1}$ is increasing and $U_{P,2}$ is decreasing at $S = W - c_P$. From above it follows that the maximal level of utility is achieved at $S = W - c_P$.

**Proof of proposition (1):**

We show, that a plaintiff with reference-dependent preferences will always choose a borderline type below the benchmark model. We therefore evaluate the optimal condition for plaintiff with reference-dependent preferences for the optimal choice of a risk-neutral plaintiff. The optimal conditions for a plaintiff with reference-dependent preferences are given by condition (5), (6) and (7). Let $q_N$ be the optimal borderline type for a risk-neutral plaintiff, which is given by:

$$[1 - F(q_N)]W - f(q_N)[c_D + c_P] = 0.$$  

Then the first order condition for a plaintiff with reference-dependent preferences is given by:

$$
\frac{dU_P(q^N)}{dq(S)} = \left[1 - F(q^N)\right]W - f(q^N)[c_D + c_P] + M'_P(q^N - r_P|q(S)) = 0
$$

, with

$$M'_P(q^N - r_P|q(S)) = -l_P \left\{ f(q^N)\left[1 - F(q^N)\right] \left[2q^N(1 - q^N)W + (1 - 2q^N)[c_D + c_P]\right] + F(q^N)[1 - 2\pi]\left[[1 - F(q^N)]W - f(q^N)[c_D + c_P]\right] \right\}, \quad (A.2)$$

for $q(S) < \frac{W - c_P - c_D}{W}$ and

$$M'_P(q^N - r_P|q(S)) = -l_P \left\{ f(q^N)\left[1 - F(q^N)\right] [c_D + c_P] + 2F(q^N)\pi(1 - q^N)W\right]$$

$$+ [1 - F(q^N)]\left[[1 - F(q^N)]W - f(q^N)[c_D + c_P]\right] \right\}, \quad (A.3)$$
for $q(S) < \frac{W-c_p-c_D}{W}$. The first line of equation (A.3) is clearly negative and therefore it follows that for $q(S) > \frac{W-c_p-c_D}{W}$, the borderline type is lower than in the benchmark case. We now have to show that the first line of equation (A.2) is also always negative.

We therefore assume that $q^N = \frac{W-c_p-c_D}{W} - \epsilon$, with $\epsilon \in (0, W - c_p - c_D)$. Therefore the the first line of equation (A.2) is given by:

$$2 * \frac{W - c_p - c_D - \epsilon}{W} (1 - \frac{W - c_p - c_D - \epsilon}{W}) W + \left(1 - 2 * \frac{W - c_p - c_D - \epsilon}{W}\right) [c_D + c_p]$$

Simplifying yields:

$$2 * \left(\frac{W - c_p - c_D - \epsilon}{W}\right) [c_D + c_p + \epsilon] - \left(\frac{W - 2 * \epsilon}{W}\right) [c_D + c_p]$$

The product on the left side is always positive and always larger than the product on the right side. Hence the first line of equation (A.2) is always negative and the borderline type is lower than in the benchmark model for $q(S) < \frac{W-c_p-c_D}{W}$.

**Comparative statics of $S$:**

We display the comparative statics result regarding the settlement amount $S$. We give the effect of a higher judgment amount, higher litigation costs of the plaintiff and the defendant and higher loss-aversion of the plaintiff on the optimal settlement demand of the plaintiff.

The condition for the optimal settlement amount is given by:

$$\frac{\partial U_P(S|S)}{\partial S} = [1 - F(q(S))] + \frac{f(q(S))}{W} \left[S + c_p - q(S)W\right]$$

$$-l_p \left\{ \frac{f(q(S))}{W} [1 - F(q(S))] \left[1 - 2q(S)\right][S + c_p + q(S)W] \right\} = 0,$$  

(A.4)

for $S < W - c_p$ and

$$\frac{\partial U_P(S|S)}{\partial S} = [1 - F(q(S))] + \frac{f(q(S))}{W} \left[S + c_p - q(S)W\right]$$

$$-l_p \left\{ 2f(q(S))F(q(S))\pi(1 - q(S)) + \frac{f(q(S))}{W} [1 - F(q(S))] \left[S + c_p - q(S)W\right] \right\} = 0,$$  

(A.5)

for $S > W - c_p$.

Note that the last line of condition (A.4) and (A.5) is the optimal condition as in the
benchmark model. The second line is always negative and hence, the optimal settlement amount is lower than in the benchmark case.

To derive the comparative static results, we use the implicit function theorem with regards to condition (A.4) and (A.5) and make use of the fact the for \( S^* \) to be the optimal settlement amount the second order condition has to be negative.

The effect of higher \( W \) on the optimal settlement amount \( S^* \) is hence given by:

\[
\frac{dS^*}{dW} = \frac{S - c_P}{W} - \frac{\partial q(S)}{\partial S} f(q(S))^* \left[ \frac{c_P + c_D}{W} + l_P \left[ 1 - 2F(q(S)) \right] \left( 1 - 2\pi \right) - 2 \left[ 1 - F(q(S)) \right] [q(S) - \pi] \frac{c_P + c_D}{W} \right]
\]

for \( S < W - c_P \) and

\[
\frac{dS^*}{dW} = \frac{S - c_P}{W} - \frac{\partial q(S)}{\partial S} f(q(S)) \left[ 1 + l_P \left[ 1 - 2F(q(S)) \right] - 2q(S) \left[ 1 - F(q(S)) \right] \right]
\]

for \( S > W - c_P \).

The effect of higher \( c_P \) on the optimal settlement amount \( S^* \) is given by:

\[
\frac{dS^*}{dc_P} = -\frac{\partial q(S)}{\partial S} f(q(S)) \left[ 1 + l_P \left[ 1 - 2F(q(S)) \right] - 2q(S) \left[ 1 - F(q(S)) \right] \right]
\]

for \( S < W - c_P \) and

\[
\frac{dS^*}{dc_P} = -\frac{\partial q(S)}{\partial S} f(q(S)) \left[ 1 + l_P \left[ 1 - 2F(q(S)) \right] \right]
\]

for \( S > W - c_P \).

The effect of higher \( c_D \) on the optimal settlement amount \( S^* \) is given by:

\[
\frac{dS^*}{dc_D} = 1 - \frac{\partial q(S)}{\partial S} f(q(S)) \left[ 1 + l_P \left[ F(q(S)) \left[ 1 - 2\pi \right] - 2F(q(S)) \right] \right]
\]

for \( S < W - c_P \) and

\[
\frac{dS^*}{dc_D} = 1 - \frac{\partial q(S)}{\partial S} f(q(S)) \left[ 1 + l_P \left[ 1 - 2F(q(S)) \right] \right]
\]

for \( S > W - c_P \).
The effect of higher \( l_P \) on the optimal settlement amount \( S^* \) is given by:

\[
\frac{dS^*}{dl_P} = -\frac{1}{\partial S^*}\left\{ \frac{f(q(S))}{W} \left[ 1 - F(q(S)) \right] \left[ 1 - 2q(S) \right] [S + c_P] + q(S)W \right.
\]

\[
+ F(q(S)) \left[ 1 - F(q(S)) \right] - \frac{f(q(S))}{W} \left[ S + c_P - q(S)W \right] \}\right),
\]

for \( S < W - c_P \) and

\[
\frac{dS^*}{dl_P} = -\frac{1}{\partial S^*}\left\{ 2f(q(S))F(q(S))\pi(1 - q(S)) + \frac{f(q(S))}{W} \left[ 1 - F(q(S)) \right] \left[ S + c_P - q(S)W \right] \right.
\]

\[
+ F(q(S)) \left[ 1 - F(q(S)) \right] - \frac{f(q(S))}{W} \left[ S + c_P - q(S)W \right] \}\right),
\]

for \( S > W - c_P \).

\[\text{Proof of proposition } 3\] Under the British rule the defendant is indifferent between settling and going to trial for a settlement offer of:

\[S = p \left[ W + c_P + c_D \right].\]

Using the definition over the optimal borderline type, we get:

\[q_{BR}(S) = \frac{S}{W + c_P + c_D}.\] (A.6)

For the plaintiff, expected utility under the British rule is given by:

\[U_{P, BR}(S | S) = \left[ 1 - F(q(S)) \right] S + F(q(S)) \left[ \pi W - \left[ 1 - \pi \right] [c_D + c_P] \right] + M_P(S - r | S)\] (A.7)

with

\[M_P(S - r | S) = -l_P \left\{ F(q(S))^2 \pi(1 - \pi) [W + c_P + c_D] \right.
\]

\[
+ F(q(S)) \left[ 1 - F(q(S)) \right] \left[ \pi [W - S] + \left[ 1 - \pi \right] [S - (-c_D - c_P)] \right] \}\right),\] (A.8)

for \( S < W \) and

\[M_P(S - r | S) = -l_P \left\{ F(q(S))^2 \pi(1 - \pi) [W + c_P + c_D] \right.
\]

\[
+ F(q(S)) \left[ 1 - F(q(S)) \right] \left[ S - (\pi W - \left[ 1 - \pi \right] [c_D + c_P]) \right] \}\right),\] (A.9)

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for $S > W$\footnote{Under the British rule the plaintiff receives $W$ in case of winning the trial. Therefore the condition for the different gain-loss utilities depend on $S \gtrless W$.}

To compare the likelihood of settlement under the British rule and the American rule, we derive the conditions for the different gain-loss functions dependent on $q(S)$. Making use of the fact that $S = q(S)[W + c_P + c_D]$, the condition $S \gtrless W$ can be rewritten to $q(S) \gtrless \frac{W}{W + c_P + c_D}$.

The condition for the optimal borderline type under the British rule is derived by plugging in $S = q(S)[W - c_P - c_D]$ into condition (A.7) and maximizing over $q(S)$. The condition for the optimal borderline type under the British rule is given by:

$$[1 - F(q(S))] [W + c_P + c_D] + M_P(q(S) - r_P|q(S)) = f(q(S))[c_D + c_P] \quad (A.10)$$

with

$$M_P(q(S) - r_P|q(S)) = -l_P \left\{ f(q(S)) [1 - F(q(S))] [q(S)] [W - q(S)[W + c_P + c_D]] + (1 - q(S))[q(S)] [W + c_P + c_D] + c_D + c_P \right\} + F(q(S))[1 - 2\pi \left[ [1 - F(q(S))] [W + c_P + c_D] - f(q(S))[c_D + c_P] \right] \right\}, \quad (A.11)$$

for $q(S) \in [a, \frac{W}{W + c_P + c_D})$ and

$$M'_P(q(S) - r_P|q(S)) = \left\{ f(q(S)) \left[ [1 - F(q(S))] [c_D + c_P] + 2F(q(S))\pi(1 - q(S))[W + c_P + c_D] \right] 
+ F(q(S)) \left[ [1 - F(q(S))] [W + c_P + c_D] - f(q(S))[c_D + c_P] \right] \right\} \quad (A.12)$$

for $q(S) \in (\frac{W}{W + c_P + c_D}, b)$. 

For the comparison of the likelihood of settlement under the American and the British rule, we denote the optimal borderline type under the American rule by $q^*_{AR}(S)$ and the optimal borderline type under the British rule by $q^*_{BR}(S)$. Let $U_{P,BR,1}$ be the utility function which applies for $q(S) \in [a, \frac{W}{W + c_P + c_D})$ and $U_{P,BR,2}$ the utility function which applies for $q(S) \in (\frac{W}{W + c_P + c_D}, b]$. Then $q_{BR,1}(S) \equiv \arg\max_{q(S)} U_{P,BR,1}$ and $q_{BR,2}(S) \equiv \arg\max_{q(S)} U_{P,BR,2}$\footnote{The results from corollary \ref{corollary} carry over to the case of the British rule.} We compare the cases where the settlement offer is below the payoff of winning the trial against each other and the cases where the settlement offer is above the
payoff of winning the trial for both cost rules. Hence we compare the optimal borderline
types $q_{AR,1}(S)$ to $q_{BR,1}(S)$ and $q_{AR,2}(S)$ to $q_{BR,2}(S)$ separately. Therefore we evaluate the
first order condition of $U_{P, BR, i}$, at $q^*_i(S)$ with $i = \{1, 2\}$. If follows that
\[
\frac{\partial U_{P, BR, 1}(q^*_{AR,1}(S))}{\partial q(S)} = [1 - F(q^*_{AR,1}(S))] [cp + c_D] 
- l_D [cp + c_D] \left\{ 2f(q^*_{AR,1}(S)) [1 - F(q^*_{AR,1}(S))] q^*_{AR,1}(S)(1 - q^*_{AR,1}(S)) 
+ F(q^*_{AR,1}(S)) [1 - F(q^*_{AR,1}(S))] [1 - 2\pi(q^*_{AR,1}(S))] \right\}
\]
and
\[
\frac{\partial U_{P, BR, 2}(q^*_{AR,2}(S))}{\partial q(S)} = [1 - F(q^*_{AR,2}(S))] [cp + c_D] 
- l_D [cp + c_D] \left\{ 2f(q^*_{AR,2}(S)) F(q^*_{AR,2}(S)) \pi(q^*_{AR,2}(S))(1 - q^*_{AR,2}(S)) 
+ F(q^*_{AR,2}(S)) [1 - F(q^*_{AR,2}(S))] \right\}
\].

Hence for $\pi < 0.5$ the marginal effect of a higher borderline type on the gain-loss utility
is more pronounced under the British rule and for a high degree of loss aversion
$q^*_{AR,1}(S)) > q^*_{BR,1}(S))$. The comparison is ambiguous otherwise. For a high degree of loss
aversion it follows that $q^*_{AR,2}(S)) > q^*_{BR,2}(S))$. The comparison is ambiguous otherwise.

*Proof of $S < W + c_D$ under assumption 1.*

We want to show that for $l_D < \frac{1}{b}$ the plaintiff demands a settlement amount $S < W + c_D$. Using the settlement amount $S$ for which a defendant of type $q(S)$ is just indifferent
between accepting and rejecting the settlement offer, it has to hold from equation [8]:
\[
q(S)W + c_D + q(S)\{1 - q(S)\}l_DW < W + c_D.
\]
Rearranging yields:
\[
l_D < \frac{1}{q(S)}.
\]
The term on the right hand side is the lowest, for $q(S) = b$. Therefore if $l_D < \frac{1}{b}$, the
highest possible settlement amount $\overline{S}$ is smaller than $W + c_D$. 

Proof of lemma 7.

The settlement amount the plaintiff will offer to a defendant of type $q(S)$ is given through: $S = q(S)W + c_D + q(S)(1 - q(S))l_DW$. Rearranging this expression yields:

$$l_DWq(S)^2 - (1 + l_D)Wq(S) + S - c_D = 0.$$ 

The optimal types for which the defendant is indifferent between accepting and rejecting the settlement offer are therefore given by:

$$q(S) = \frac{1 + l_D}{2l_D} \pm \sqrt{\left[\frac{1 + l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}}$$

For $q(S)$ to exist, $q(S)$ has to fall in the interval of $[0, 1]$. We show, that $q_1(S) = \frac{1 + l_D}{2l_D} + \sqrt{\left[\frac{1 + l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}} > 1$ for $S < \overline{S}$ and therefore cannot be an optimal solution under assumption 1. We then show that $q_2(S) = \frac{1 + l_D}{2l_D} - \sqrt{\left[\frac{1 + l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}} \in [0, 1] \forall S \in [0, \overline{S}]$.

Assume $q_1(S) = \frac{1 + l_D}{2l_D} + \sqrt{\left[\frac{1 + l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}} < 1$. Rearranging yields:

$$\frac{(1 + l_D)^2}{4l_D^2} - \frac{S - c_D}{l_DW} < \frac{(l_D - 1)^2}{4l_D^2}$$

or equivalently:

$$1 < \frac{S - c_D}{W}.$$

Under assumption [1] we know that $S < c_D + W$. Hence $1 < \frac{S - c_D}{W}$ does never hold under assumption [1] and hence $q_1(S)$ cannot be an optimal solution.

Now we have to show that $q_2(S) = \frac{1 + l_D}{2l_D} - \sqrt{\left[\frac{1 + l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}}$ always lies in the interval $[0, 1]$.

Assume

$$\frac{1 + l_D}{2l_D} - \sqrt{\left[\frac{1 + l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}} < 0.$$ 

Then rearranging yields

$$\left[\frac{1 + l_D}{2l_D}\right]^2 < \left[\frac{1 + l_D}{2l_D}\right]^2 - \frac{S - c_D}{l_DW}$$

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or equivalently

\[ 0 < -\frac{S - c_D}{l_D W} \]

Note that \( S \geq c_D \) is a dominant strategy for the plaintiff. For \( S < c_D \) the plaintiff can raise her payoff by increasing \( S \) to \( c_D \), since the probability of acceptance is always 1 for the defendant. Hence \( 0 < -\frac{S - c_D}{l_D W} \) is a contradiction and \( q_2(S) \geq 0 \).

Now assume

\[ \frac{1 + l_D}{2l_D} - \sqrt{\left[ \frac{1 + l_D}{2l_D} \right]^2 - \frac{S - c_D}{l_D W}} > 1. \]

Then rearranging yields

\[ \left[ \frac{1 - l_D}{2l_D} \right]^2 > \left[ \frac{1 + l_D}{2l_D} \right]^2 - \frac{S - c_D}{l_D W} \]

or equivalently:

\[ \frac{S - c_D}{W} > 1. \]

Under assumption \( \mathbb{I} \) this is again a contradiction, indicating that, \( q_2(S) \in [0, 1] \).

To show that \( q(S) \) always exist, the difference under the square root always has to be larger or equal to zero. Therefore it has to hold that, \( \left[ \frac{1 + l_D}{2l_D} \right]^2 > \frac{S - c_D}{l_D W} \). Rearranging yields \( \frac{(1 + l_D)^2}{4l_D} W + c_D > S \). Now notice that \( \frac{(1 + l_D)^2}{4l_D} > 1 \) and hence from assumption \( \mathbb{I} \) it holds that \( \frac{(1 + l_D)^2}{4l_D} W + c_D > S \). Therefore \( q_2(S) \in [0, 1] \) exists. Since \( q_2(S) \) is a continuous function for \( S \in [c_D, W + c_D] \) it follows that \( q(S) \in [a, b] \).

Derivation of the marginal effect of \( q(S) \) on the gain-loss utility of the plaintiff for a defendant with reference-dependent preferences.

The expected utility of the plaintiff is given by:

\[ U_P(S|S) = \left[ 1 - F(q(S)) \right] S + F(q(S)) \left[ -c_P + \pi W \right] + M_P(S - r|S). \]

Plugging in condition \( (8) \) and maximizing over \( q(S) \) yields the condition for the optimal borderline type:

\[ [1 - F(q(S))] [1 + (1 - 2q(S)) l_D] W + M_P(q(S) - r_P|q(S)) = f(q(S)) [c_D + c_P + q(S)(1 - q(S)) l_D W], \quad (A.13) \]
with
\[
M_P'(q(S) - r_P|q(S)) = -l_P \left\{ f(q(S)) \left[ 1 - F(q(S)) \right] \left[ 2q(S)(1 - q(S))W + (1 - 2q(S))[c_D + c_P + q(S)(1 - q(S))l_DW] \right] + F(q(S))[1 - 2\pi] \left[ 1 - F(q(S)) \right] \left[ 1 + (1 - 2q(S))l_DW \right] - f(q(S))[c_D + c_P + q(S)(1 - q(S))l_DW] \right\} \tag{A.14}
\]
for \( q(S) \in \left[ a, \frac{1 + l_D}{2D} - \sqrt{\left( \frac{1 + l_D}{2D} \right)^2 - \frac{W - c_p - c_p}{W}} \right] \) and
\[
M_P'(q(S) - r_P|q(S)) = -l_P \left\{ f(q(S)) \left[ 1 - F(q(S)) \right] \left[ c_D + c_P + q(S)(1 - q(S))l_DW \right] + 2F(q(S))\pi(1 - q(S))W \right\} + F(q(S)) \left[ 1 - F(q(S)) \right] \left[ 1 + (1 - 2q(S))l_D \right] - f(q(S))[c_D + c_P + q(S)(1 - q(S))l_DW] \right\}, \tag{A.15}
\]
for \( q(S) \in \left( \frac{1 + l_D}{2D} - \sqrt{\left( \frac{1 + l_D}{2D} \right)^2 - \frac{W - c_p - c_p}{W}}, b \right] \).

Note that the conditions for the different gain-loss functions are again derived by plugging in \( S = W - c_P \) into condition (9). To compare the borderline type to the case of a defendant without reference-dependent preferences, we evaluate the optimal conditions (A.13) at \( q^*_1(S) \) and \( q^*_2(S) \) separately.

Let \( U_{P,RD,1}(q(S)|q(S)) \) be the utility function for \( q(S) \in \left[ a, \frac{1 + l_D}{2D} - \sqrt{\left( \frac{1 + l_D}{2D} \right)^2 - \frac{W - c_p - c_p}{W}} \right] \) and \( U_{P,RD,2}(q(S)|q(S)) \) for \( q(S) \in \left( \frac{1 + l_D}{2D} - \sqrt{\left( \frac{1 + l_D}{2D} \right)^2 - \frac{W - c_p - c_p}{W}}, b \right] \). We define \( q_{RD,1}(S) \equiv \arg \max_{q(S)} U_{P,RD,1}(q(S)|q(S)) \) and \( q_{RD,2}(S) \equiv \arg \max_{q(S)} U_{P,RD,2}(q(S)|q(S)) \). We compare \( q^*_1(S) \) to \( q^*_1(S) \) and \( q^*_2(S) \) to \( q^*_2(S) \). It follows that:
\[
\frac{\partial U_{P,RD,1}(q^*_1(S)|q^*_1(S))}{\partial q(S)} = \left[ 1 - F(q^*_1(S)) \right] \left[ (1 - 2q^*_1(S))l_DW - f(q^*_1(S))(1 - q^*_1(S))l_DW \right] - l_Pl_DW \left\{ f(q^*_1(S))[1 - F(q^*_1(S))](1 - 2q^*_1(S))q^*_1(S)(1 - q^*_1(S)) + F(q^*_1(S))[1 - 2\pi(q^*_1(S))][1 - F(q^*_1(S))](1 - 2q^*_1(S)) - f(q^*_1(S))q^*_1(S)(1 - q^*_1(S)) \right\}
\]
and
\[
\frac{\partial U_{RD,2}(q^*_2(S)|q^*_2(S))}{\partial q(S)} = \left[1 - F(q^*_2(S))\right] \left[(1 - 2q^*_2(S))l_DW - f(q^*_2(S))q^*_2(S)(1 - q^*_2(S))l_DW\right]
- \left[l_Dl_W \left\{ F(q^*_2(S)) \left[1 - F(q^*_2(S))\right] q(S)(1 - q^*_2(S)) \right\} - F(q^*_2(S)) \left[(1 - F(q^*_2(S)))[1 - 2q^*_2(S)] - f(q^*_2(S))q^*_2(S)(1 - q^*_2(S))\right] \right].
\]

**Proof or proposition**

We display the outcomes if the reference point is either the wealth before the accident or the wealth after the accident but before pretrial negotiations. Let the reference point of the plaintiff be given by \(R\). To compare different potential reference points, let \(R \in [0, W]\). A reference point of zero depicts the case, when the loss from the accident is already incorporated into plaintiffs considerations when she starts the settlement negotiations. A reference point of \(W\) depicts the case, when the wealth before the accident is the reference point. By allowing for the interval \([0, W]\) we also take into account other forms of status quo reference points. Let’s first consider the case of \(R \in (W - c_P, W]\). For \(S < R\) the plaintiff is always in the loss frame and hence the expected utility of the plaintiff is given by:
\[
U_P = \left[1 + \lambda_P\eta_P\right] \left\{ [1 + F(q(S))] S + F(q(S)) \left[-c_P + \pi W\right]\right\} - \eta_P\lambda_P R
\]
which yields exactly the same optimal borderline type and settlement demand as in the benchmark case.

For \(S > R\) the expected utility is given by:
\[
U_P = \left[1 + F(q(S))\right] [S + \eta_P[S - R]] + F(q(S)) \left[1 + \lambda_P\eta_P\right] \left[-c_P + \pi W\right] - \eta_P\lambda_P R
\]
The condition for the optimal borderline type is given by:
\[
\frac{dU_P}{dq(S)} = \left[1 + F(q(S))\right] [\eta_P + 1] W
- f(q(S)) \left[1 + \eta_P\lambda_P\right] c_P + \left[1 + \eta_P\right] c_D + \eta_P \left\{ [\lambda_P + 1] R - [\lambda_P - 1] q(S)W\right\}
\]
Note that \(R \in [W - c_P, W]\) and hence \([\lambda_P + 1] R - [\lambda_P - 1] q(S)W > 0\). Hence in both cases loss-aversion on part of the plaintiff unambiguously increases the likelihood of settlement.
Also note that higher litigation costs unambiguously increase the costs from not settling and hence increases the likelihood of settlement. The effect of a higher judgment award is given by:

\[
\frac{dq^*}{dW} = -\frac{f(q(S))}{\partial^2 U_P/\partial q(S)} \left\{ \frac{1}{W} \left[ 1 + \eta_P \lambda_P \right] c_P + \left[ 1 + \eta_P \right] c_D + \eta_P \left\{ [\lambda_P + 1] R - [\lambda_P - 1] q(S) W \right\} \right. \\
\left. + \eta_P [\lambda_P - 1] q(S) \right\} > 0
\]

Hence for \( R \in [W - c_P, W] \) the comparative static results have the same sign as in the benchmark case.

For \( R \in [0, W - c_P] \) and \( S > R \) the expected utility of the plaintiff amounts to:

\[
U_P = \left[ 1 + F(q(S)) \right] \left[ S + \eta_P[S - R] \right] + F(q(S)) \left[ - c_P + \pi W \right. \\
\left. + \pi \eta_P[W - c_P - R] + [1 - \pi] \eta_P \lambda_P [-c_P - R] \right]
\]

Taking the derivative with respect to \( q(S) \) yields:

\[
\frac{dU_P}{dq(S)} = \left[ 1 - F(q(S)) \right] W - \frac{f(q(S))}{\eta_P + 1} \left\{ q(S)[\eta_P + 1] c_P + (1 + q(S))[\eta_P \lambda_P + 1] c_P + [\eta_P + 1] c_D \right. \\
\left. + (1 - q(S)) \eta_P [\lambda_P - 1] R \right\}.
\]

Again note that loss aversion increases the likelihood of settlement and the comparative static results are the same as in the benchmark case. For \( S < R \) the expected utility of the plaintiff amounts to:

\[
U_P = \left[ 1 + F(q(S)) \right] \left[ S + \eta_P \lambda_P[S - R] \right] + F(q(S)) \left[ - c_P + \pi W \right. \\
\left. + \pi \eta_P[W - c_P - R] + [1 - \pi] \eta_P \lambda_P [-c_P - R] \right].
\]

Taking the derivative with respect to \( q(S) \) and some simplifications yields:

\[
\frac{dU_P}{dq(S)} = \left[ 1 - F(q(S)) \right] W - \frac{f(q(S))}{\eta_P \lambda_P + 1} \left\{ [\eta_P \lambda_P + 1] c_P + [\eta_P \lambda_P + 1] c_P + q(S) \eta_P [\lambda_P - 1] [W - c_P - R] \right\}.
\]

Again note that loss aversion increases the likelihood of settlement and the comparative static results are the same compared to the benchmark case.
References


