Risk-Neutrality and Strategic Insurance

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Abstract

The paper shows that Legal Cost Insurance (LCI) is a device to enhance potential litigants' bargaining position rather than to re-allocate risk. Being insured decreases the cost an insured party has to bear if settlement negotiations fail and the case goes to trial. This shifts the threat points, which has an impact on the bargaining result. In negative expected value suits, LCI can make the threat to sue credible and motivate potential defendants to make positive settlement offers. Hence, even risk-neutral agents may find it beneficial to insure.

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1. Introduction

The demand for insurance is traditionally explained by the assumptions that insured are risk-averse, whereas insurers are risk-neutral[1]. Risk-neutral customers, however, would not be interested in insuring at a premium that exceeds the expected loss, i.e. the actuarial fair rate. To introduce a numerical example, under the risk-allocation point of view, an insurance that covers an expected loss of 300 and charges a premium of 400 would never be acceptable to a risk-neutral agent.

However, there are some limitations to the explanatory power of the risk-allocation approach. E.g., firms are quite an important group of customers. Ashby/Diacon (1999) point out that firms have a linear rather than a concave yield function and therefore cannot be judged as risk-averse[2]. Goldberg (1990) furthermore argues against the careless usage of the ad-hoc assumption of risk-aversion in institutional economics, because it keeps the focus away from other useful insights which might be better able to explain firms' behavior, such as specific investments.

There is a growing literature that analyzes why risk-neutral agents, in particular firms, might be interested in buying insurance even at a premium above the fair rate, or why they invest in risk-management. Insurers do not only cover risks, but also provide other services, such as the evaluation of risky situations or the professional handling of settlements[3]. With respect to risk-neutral insurance customers, a new branch of literature seems to establish.

In this paper, I introduce another reason why risk-neutral agents can benefit from insurance. I analyze legal cost insurance as an example for a strategic device that influences the interaction of the insured with other agents[4]. This strategic aspect has not been focussed on yet, hence this paper adds a new contribution to the literature on risk-neutrality and insurance.

Under the strategic approach, it is not the aspect of risk- allocation that makes legal cost insurance beneficial for potential litigants, but the possibility to improve their strategic position in a law suit. Legal cost insurance has two strategic effects in a game with settlement and trial. First of all, legal cost insurance can make the plaintiff's threat to sue credible even if the case has a negative expected value[5]. The second strategic effect of legal cost insurance is to shift the bargaining range and therefore the settlement result. This effect can make legal cost insurance attractive for both of the litigants even in a

[1] See e.g. Arrow (1971) and Rothschild/Stiglitz (1976) or one of the enormous number of textbooks on this topic, see e.g. Williams/Smith/Young (1998, 36f.).

[2] The authors show that a risk-neutral firm with market power may have an incentive to reduce technological risk, i.e. the variance of its uncertain output.

[3] See Mayers/Smith (1982); see also Skogh (1998), who points out that risk-averison is only one out of many reasons for insurance.

[4] Legal cost insurance and risk-averse plaintiffs are analyzed in Rickman/Heyes (1998).

[5] Note that negative expected value suits are not necessarily meritless, see Bebchuk (1998). A legitimate suit can have a negative expeceted value even if the probability to prevail in court is high, due to excessively high litigation costs.

positive expected value suit.

Extending the numeric example introduced above might be helpful to explain why taking account of strategic effects may lead to a different result: Assume that litigation costs are 1000, of which the the insured had to bear a deductible of 700 in case of trial. Thus, as in the example above, the insurance covers 300. Let the insurance premium again be 400. If the strategic effect of legal cost insurance leads to a settlement of 500 (whereas without legal cost insurance, the settlement result would be zero), then it is beneficial for a plaintiff to insure even when he is risk-neutral.

Without legal cost insurance in negative expected value cases, the threat to sue would be noncredible, and the potential defendant would not agree to make a positive settlement payment. If, on the other hand, the potential plaintiff is insured, the insurance premium is sunk when the settlement negotiations take place. The idea to turn a negative expected value case into a positive expected value case by distributing the litigation costs over time is due to Bebchuk (1996). However, he analyzes retainer fees rather than legal cost insurance[6]. Retainers differ from legal cost insurance in two aspects:

- Under the British legal cost allocation rule, a prevailing plaintiff would receive reimbursement for retainer fees, but not for the insurance rate he has paid. Thus, the retainer is not entirely sunk, whereas the insurance premium is sunk.
- Under both the British and the American rule, the retainer and the residual fee add up to the total litigation costs, whereas the sum of insurance premium and deductible do not necessarily add up to the litigation costs.

The paper is organized as follows: Section 2 presents the model. In section 3, the equilibrium solution for positive and negative expected value suits is derived. Section 4 presents the main results and discusses briefly the impact of some modifications of the assumptions I made.

2. The model

Consider two risk-neutral players, P and D, that engage in a dangerous activity. For example, P is a pedestrian, D a driver; the latter might cause an accident that harms the former. The interaction takes place in three stages:

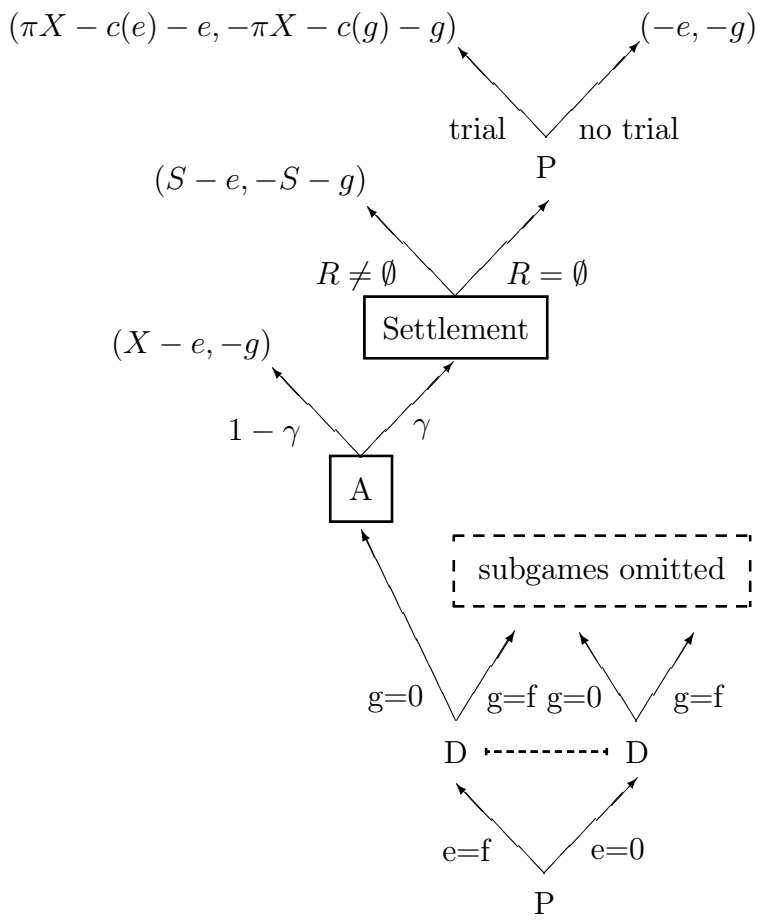
- **The insurance stage:** P and D simultaneously decide whether to buy a legal cost insurance or not.
- **The accident stage:** An accident might occur at probability γ, which causes harm to P, who values not having to suffer this harm with X.

[6] See also Bebchuk/Guzman (1996) and Croson/Mnookin (1996). The latter point out that non-refundable retainers may have a strategic impact similar to the one described here, but admit that the assumption of non- refundability might be problematic.

- **The litigation stage** If an accident has occured, the parties negotiate on a settlement. If they reach an agreement, the game ends with a payment S from D to P. If the parties do not reach an agreement, P has to decide whether to proceed to trial or not. In case of trial, the judge decides with probability π in favor of P.

Figure 1 represents these three stages graphically. The tree starts at the bottom with the decision of the parties whether to insure or not. Since this decision takes place simultaneously, the two decision nodes of D are within one information set, which is indicated by a dashed line between these two nodes.

Figure 1: The interaction between P and D



The insurance stage leads to four possible combinations of decisions. $f > 0$ is the insurance premium (and assumed to be positive, since the insurance company needs to cover at least the marginal costs of contracting). $e = f$ denotes the decision of P to insure and $g = f$ represents the decision of D to buy insurance. $e = 0$ and $g = 0$ stand for the decision of P or D, respectively, not to purchase insurance. To simplify **figure 1**,

three of the subgames that arise out of the insurance stage have been eliminated, as it is indicated by the dashed box. Thus, **figure 1** shows the accident and litigation stages only for one of these four branches, namely the combination $e = f$ and $g = 0$ (where only P is insured)[7].

The accident stage is represented by the box labelled with "A". In one case no accident occurs with probability $1 - \gamma; 0 < \gamma < 1$ and the game ends[8]. Due to the assumed risk-neutrality, P is not interested in buying a risk-insurance to cover the accident loss (at least not at a premium that exceeds the actuarial fair rate). Alternatively, in the case of an accident (with probability γ), the parties enter the litigation stage. The parties have no means to influence γ. This assumption excludes any effect that precaution might have on the insurance decision.

First, the parties negotiate on a settlement. These negotiations are represented by the box labelled with the word "settlement". If the bargaining range, denoted as R, is non-empty, the parties reach a settlement, and the game ends with a payment $S \in R$ from D to P. To keep matters as simple as possible and to focus on the strategic impact of insurance, I assume settlement under perfect and complete information and neglect problems like asymmetric information or divergent expectations[9]. If, and only if, the bargaining range is empty, P has to decide whether to proceed to trial or not.

In case of trial, the plaintiff P faces litigation costs that are denoted as $c(e)$, where $e \in \{0; f\}$. If P is uninsured ($e = 0$), he has to pay the full costs $c(0)$. If he is insured ($e = f$), he only has to bear a deductible $c(f)$ which is non-negative: $c(0) > c(f) \geq 0$. The trial costs of the defendant D are respectively denoted as $c(g)$ with $c(0)$ being the full costs and $c(f)$ the deductible[10].

P prevails in trial with probability π, $0 < \pi < 1$, which is assumed to be independent of the insurance decisions of the parties. Hence, the expected payoff of P from proceeding to trial is πX minus the trial costs $c(e)$ minus the insurance premium e he has paid in advance. D's expected payoff in case of a trial is $-\pi X - c(g) - g$. Recall that in the example subgame presented in **figure 1**, g is zero, hence this payoff reduces to $-\pi X - c(0)$. If P does not proceed to trial, then the parties only have to bear their insurance premiums if they have bought an insurance during the first stage.

I assume that the insurance premium covers one period and that γ is the probability of an accident during this period. Furthermore, I assume that the parties have the same expectations concerning the probabilities γ and π.

[7] Of course, the three omitted subgames will be taken into consideration in the equilibrium analysis below.

[8] The possibility of opportunistic suits is thus excluded. See KIRSTEIN/SCHMIDTCHEN (1997) for an analysis of opportunistic suits and judicial detection skill.

[9] See BEBCHUK (1984) and PRIEST/KLEIN (1984). In KIRSTEIN (1999), I analyze legal cost insurance when the parties expectations to prevail at court diverge.

[10] Litigation costs are allocated according to the American rule: Each party has to bear its own trial costs.

3. Equlibrium analysis

In this section, the game of **figure 1** is solved by backward induction. I first analyze the litigation stage, which consists of settlement negotiations and, if settlement fails, the decision of the plaintiff whether to proceed to trial or not. As the solution concept for the settlement negotiations I use the Nash bargaining solution, assuming zero bargaining costs and equal bargaining power.

The solution of the litigation stage depends on two factors: First, the parties' decisions during the insurance stage, and second, whether the case has a negative or a positive expected value. Using the results of the litigation stage, I present the insurance stage as a reduced game form and derive parameter ranges for the different possible Nash equilibria for both the negative and the positive expected value case.

3.1 The litigation stage

If settlement negotiations fail, P will proceed to trial if, and only if, the expected payoff of the trial is positive. This payoff comprises the expected judgement πX minus the trial costs of P, $c(e)$. Hence, P will try the case if, and only if, $c(e) < \pi X$. The expected net value of the decision of P to proceed to trial is $\pi X - c(e)$ for P and $-[\pi X + c(g)]$ for D. If P does not proceed to trial, the value of this decision is zero for both of the parties.

P will proceed to trial if, and only if, the value of this decision exceeds the value of the decision not to proceed, hence if $\pi X - c(e) > 0$. In this case, his threat to try the case is credible. If, however, D expects that P will not proceed to trial, then this threat is called non-credible. Now define

- $\pi X > c(0)$ as positive expected value case,
- $\pi X < c(0)$ as negative expected value case, and
- $c(f) < \pi X$ as the Credibility Condition.

This allows to derive the first result of this paper:

> **Proposition 1:** *If, in negative expected value cases, P is not insured, then his threat to sue is non-credible. If the legal cost insurance fulfills the Credibility Condition, then it makes his threat to sue credible. In positive expected value cases, the threat to sue is credible even without legal cost insurance.*

The Nash bargaining solution requires to derive the settlement range, denoted as R. This is determined by the trial decision of P. He will only accept settlement payments S that exceed the value of his decision, namely[11]:

[11] Note that this expression is conditioned on $c(e)$, with $e \in \{0; f\}$, whereas the definition of the negative and the positive expected value cases is contingent on $c(0)$. For simplification, I do not discuss cases of indifference and assume that a settlement offer is also acceptable if it equals the threat point.

$$S \geq \begin{cases} 0 & : \quad \pi X < c(e) \\ \pi X - c(e) & : \quad \pi X > c(e) \end{cases}$$

If P credibly threats to proceed to trial, he will only accept settlement payments that exceed the (positive) net expected value of the trial. If, on the other hand, his threat to proceed is non-credible he would accept any positive settlement payment. D anticipates the trial decision of P and will only accept to make settlement payments that hold

$$-S \geq \begin{cases} 0 & : \quad \pi X < c(e) \\ -\pi X - c(g) & : \quad \pi X > c(e) \end{cases}$$

Hence, if D expects that P proceeds to trial, he would agree to make any settlement payment that is smaller than his expected loss from trial, $S < \pi X + c(g)$. If, on the other hand, he expects P not to proceed, D will not agree to make a positive settlement payment. From these considerations, the settlement range (which is limited by the parties' threat points) can be derived:

$$R = \begin{cases} [\pi X - c(e), \pi X + c(g)] & : \quad \pi X > c(e) \\ \emptyset & : \quad \pi X < c(e) \end{cases}$$

If $\pi X > c(e)$ holds, the parties reach a settlement with $S \in [\pi X - c(e), \pi X + c(g)]$. If, on the other hand, $\pi X < c(e)$ holds, neither a settlement nor a trial will take place. The latter case is equivalent to a settlement with a zero payment: none of the parties receives or pays anything, and the game ends. Hence, this case will be treated as if $S = 0$.

Obviously, the credibility of the threat to sue determines whether or not the parties agree upon a positive settlement payment[12]. From Proposition 1 it follows that, in negative expected value cases, legal cost insurance that obeys the Credibility Condition motivates D to make a positive settlement offer. The insurance decreases the costs a plaintiff has to bear in case of trial, whereas the insurance premium is sunk when the plaintiff has to make his trial decision. Hence it is only the deductible that is relevant when P has to make this decision with regard to the trial.

Under the assumption of equal bargaining power and zero bargaining costs, the Nash bargaining solution leads to the arithmetic mean of the parties' threat points as settlement payments. A legal cost insurance contract consists of the insurance premium and the deductible or the amount that is covered, hence each possible legal cost insurance contract can be described by the parameters $[f, c(f)]$.

To simplify the notation, I define a variable h that makes the following results more handy:

$$h = \frac{c(0) - c(f)}{2}$$

[12] See Nalebuff (1988, 198).

The share of a party's litigation costs that is coverd by the legal cost insurance then is $2h$. Taking into account the effect of negative expected value suits and assuming that legal cost insurance obeys the Credibility Condition, the possible settlement results, denoted as as $S(e, g)$ with $e, g \in \{0; f\}$, are:

- $S(f, f) = \pi X + \frac{c(f) - c(f)}{2} = \pi X$
- $S(f, 0) = \pi X + \frac{c(0) - c(f)}{2} = \pi X + h$
- $S(0, f) = \begin{cases} 0 & : \quad \pi X < c(0) \\ \pi X + \frac{c(f) - c(0)}{2} = \pi X - h & : \quad \pi X > c(0) \end{cases}$
- $S(0, 0) = \begin{cases} 0 & : \quad \pi X < c(0) \\ \pi X + \frac{c(0) - c(0)}{2} = \pi X & : \quad \pi X > c(0) \end{cases}$

Due to $h > 0$, in positive expected value cases $S(f, 0) > S(f, f) = S(0, 0) > S(0, f)$ holds: the settlement result is πX if neither or if both of the parties is insured. If only the plaintiff is insured, this would increase the settlement result, whereas it is smaller if only the defendant is insured.

In negative expected value cases $S(f, 0) > S(f, f) > S(0, 0) = S(0, f)$ holds: if the defendant is not insured, the settlement result will be zero. Being the only one who is insured leads to the highest settlement result for the plaintiff. If both parties are insured, the settlement result is πX, just as in a positive expected value case.

3.2 The insurance stage

It was shown in the previous section that, if the plaintiff is not insured, the positive and the negative expected value cases lead to systematically different outcomes. This difference has an impact on the analysis of the insurance stage in this section. First, I analyze the insurance stage for positive expected value cases, then I focus on negative expected value cases.

3.2.1 Positive expected value cases

First consider the positive expected value case. **Table 1** shows the insurance stage as a 2x2 game, where the payoffs are the subgame values of the litigation stage (e, g) as derived in the previous section. The strategies of P ($e = 0$ means not to insure, $e = f$ denotes the decision for insurance) are presented on the left column of **table 1**, whereas the strategies of D ($g = 0$ for no insurance, $g = f$ for insurance) can be found in the first row.

The equilibrium analysis of this game leads to the following result:

Table 1: Insurance stage, positive expected value case

D / P	$g = 0$	$g = f$
$e = 0$	$-\gamma\pi X$ $(1-\gamma)X + \gamma\pi X$	$-\gamma(\pi X - h) - f$ $(1-\gamma)X + \gamma(\pi X - h)$
$e = f$	$-\gamma(\pi X + h)$ $(1-\gamma)X + \gamma(\pi X + h) - f$	$-\gamma\pi X - f$ $(1-\gamma)X + \gamma\pi X - f$

Proposition 2: *In a positive expected value case, the strategy combination* $(e = f, g = f)$ *is a Nash equilibrium in dominant strategies if, and only if,* $f < \gamma h$ *and the Credibility Condition holds.*

If the legal cost insurance premium (which is exogenously given) is too low, the parties are in a prisoners' dilemma situation: It is individually rational to insure, because this improves the bargaining result, but if both parties are insured, the settlement payment is just the same as between uninsured parties[13].

Since the game only concerns the payoff to P and D (whereas the insurer is not taken into account), this Nash equilibrium is Pareto-inefficient. If, on the other hand, the legal cost insurance premium is sufficiently high, namely $f > \gamma h$, then the strategy combination $(e = 0, g = 0)$ is the Nash equilibrium, which is Pareto-efficient.

3.2.2 Negative expected value cases

The insurance stage in the negative expected value case is represented in **table 2**.

This game can have three different Nash equilibria in pure strategies, as the next proposition claims:

Proposition 3: *In negative expected value cases, the following strategy profiles are unique Nash equilibria in pure strategies of the insurance stage game,*

[13]N.B. that this result is not entirely driven by the assumption that the parties face equal litigation costs and insurance premiums. The prisoners' dilemma result also holds if different litigation costs and insurance premiums are assumed.

Table 2: Insurance stage, negative expected value case

P \ D	$g = 0$	$g = f$
$e = 0$	0 $(1-\gamma)X$	$-f$ $(1-\gamma)X$
$e = f$	$-\gamma(\pi X + h)$ $(1-\gamma)X + \gamma(\pi X + h) - f$	$-\gamma\pi X - f$ $(1-\gamma)X + \gamma\pi X - f$

if the Credibility Condition holds[14]*:*

- *No party insures:* $(e = 0, g = 0)$ *if, and only if,* $f > \gamma(\pi X + h)$
- *Only P insures:* $(e = f, g = 0)$ *if, and only if,* $\gamma(\pi X + h) > f > \gamma h$
- *Both parties insure:* $(e = f, g = f)$ *if, and only if,* $f < \min\{\gamma h; \gamma\pi X\}$

The strategy combination $(e = 0, g = f)$ *- only D insures - will never be a Nash equilibrium, since* $f > 0$*. The game does not have a Nash equilibrium in pure strategies if, and only if,* $\gamma h > f > \gamma\pi X$*.*

Figure 2 shows the possible constellations of the parameters f (the insurance premium) and $c(f)$ (the deductible), and the resulting equlibria (e, g). The lower diagonal line in **figure 2** represents $f = \gamma h$; above this line, the condition $f > \gamma h$ is fulfilled. The upper diagonal line stands for $f = \gamma(\pi X + h)$, the horizontal dashed line represents $f = \gamma\pi X$.[15] To the left hand side of the vertical line, the Credibility Condition is fulfilled.

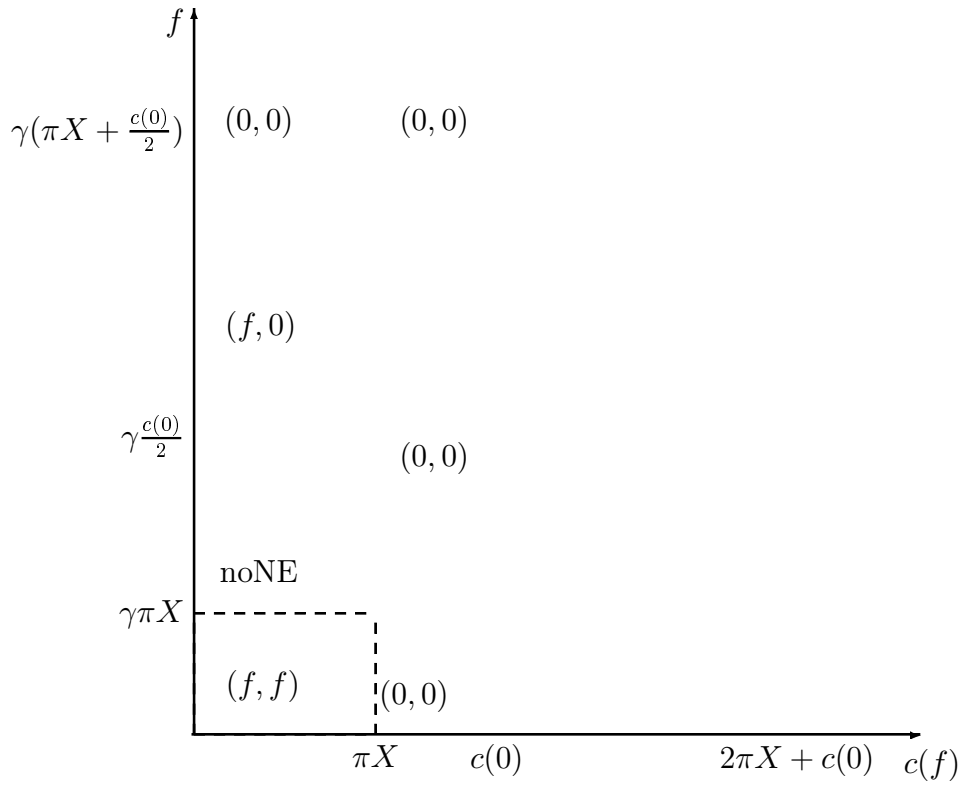
[14] **Proof of Proposition 3:**

- If $f > \gamma(\pi X + h)$, then $e = 0$ is the dominant strategy for P; $g = 0$ is always the best answer of D on this. Hence, regardless of D's best answer on $e = f$, the Nash equilibrium is $(e = 0, g = 0)$, q.e.d.
- If $f > \gamma h$, then $g = 0$ is the dominant strategy of D; with $\gamma(\pi X + h) > f$, the best answer of P is $e = f$. Hence, regardless of P's best answer on $g = f$, the Nash equilibrium is $(e = f, g = 0)$, q.e.d.
- If $f < \min\{\gamma h; \gamma\pi X\}$, which implies $f < \gamma(\pi X + h)$, the strategy $e = f$ is dominant for P and the best answer of D would be $g = f$. Hence, regardless of D's best answer on $e = 0$, the Nash equilibrium is $(e = f, g = f)$, q.e.d.

Note that the insurance game would have multiple Nash equilibria, if the above conditions did not hold strictly. E.g., with $f = \gamma(\pi X + h)$, the game has two Nash equilibria, namely $e = 0, g = 0$ and $e = f, g = 0$.

[15] As presented here, figure 2 represents the case of extraordinary high trial costs, namely $c(0) > 3\pi X$. If this condition does not hold, then the dashed horizontal line would be above the intersection of the lower diagonal with the vertical line.

Figure 2: Combinations of insurance parameters and resulting Nash equilibria



Legal cost insurance contracts with $[f, c(f)]$ combination between the diagonal lines in **figure 2** and left of the vertical line would implement the strategy combination $(e = f, g = 0)$ as the Nash equilibrium. $[f, c(f)]$ combinations above the upper diagonal line and on the right hand side of the vertical line would implement $(e = 0, g = 0)$. If the legal cost insurance contracts consist of parameter constellation above the horizontal line, but below the lower diagonal line, then the insurance stage game would have no Nash equilibrium in pure strategies (indicated as "no NE"). Below the horizontal and to the left of the vertical line, $(e = f, g = f)$ would be implemented.

4. Results and discussion

The previous section presented the positive analysis of the insurance and settlement game. In equilibrium, the insurer would never actually have to pay litigation costs, since the parties either settle or do not proceed to trial. Thus, the actuarial fair rate is zero. However, as shown above, there are equilibria in which the players are motivated to buy insurance at a positive rate, despite the fact that they are assumed to be risk-neutral.

In negative expected value suits, the threat to sue is non-credible and thus the defendant is not motivated to make a positive settlement offer. In this case, a legal cost insurance

that holds the Credibility Condition provides a credible threat for the plaintiff and thereby induces a settlement. Even in positive expected value suits, the parameters can be such that legal cost insurance is attractive for one or the other party in order to improve their settlement position.

But the analysis does not provide an answer to the normative question which of the possible equilibria should be implemented. If the legal system aims to protect the legitimate claim of P and simultaneously wants to discourage D from buying insurance only for redistributive purposes, then the Nash equilibrium ($e = f, g = 0$) in the insurance stage can be realized by setting the insurance premium f such that

$$\gamma(\pi X + h) > f > \gamma h$$

with $h = [c(0) - c(f)]/2$. Hence, under the assumptions made, it is possible to regulate legal cost insurance such that legimate claims lead to positive settlements, but a suboptimal Nash equilibrium in positive expected value cases can be avoided, as well as insurance only for redistributive purposes.

If some of the assumptions of the model are relaxed, this may have an effect on the results I derived. E.g., BEBCHUK (1984) and (1988) analyzes settlement under incomplete information - in these models the plaintiff can hope for a positive settlement even in negative expected value cases[16]. On the other hand, it is not crucial which cost allocation rule is taken under consideration. To replace the American by the British rule would lead to results that are quantitatively different, but qualitatively equal to the results presented here. The same holds if the model would take into account that the parties' might face different litigation costs, deductibles, or insurance premiums.

One assumption, however, is important for the results: the legal cost insurance covers the litigation costs minus the deductible. This implicitly excludes renegotiations between the plaintiff and the insurance company before (or during) trial. If the defendant could expect the insurance to buy the plaintiff's right to sue, this would destroy the strategic effect of legal cost insurance[17]. Yet, the insurer does not only deal with single plaintiffs, but also with other customers, now and in the future. Therefore, he has to preserve a reputation for carrying out the insurance contracts. This may provide enough incentives to abstain from renegotiaions with his customers, which would preserve the strategic effect under consideration. The insurer has an interest in the rent he draws from this strategic effect. This rent is caused by the imperfectness of the court system, in particular the fact that court costs are positive, $c(0) > 0$, and judicial errors occur, $\pi < 1$. With $\pi = 1$ and $c(0) = 0$, each case has positive expected value, no one would insure, and there would be no room for a strategic insurance.

In the model, the insurance contract parameters (premium and deductible) are treated as exogenous and are subject to a comparative static analysis. It would be an interesting next step to treat the insurance company as a player that chooses these parameters in

[16] See also NALEBUFF (1988).

[17] I owe this to Omir Ben-Shahar; see also the discussion in BEBCHUK/GUZMAN 1996.

order to maximize its profits, subject to the constraints provided by the equilibrium analysis presented here. In a further step, competition among insurers could be introduced to gain further insights on the strategic effect of insurance for risk-neutral customers.

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