



Subrogation and its consequences for tort litigation

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ABSTRACT

In the U.S. tort recoveries of personal injury victims are now fully subject to subrogation claims by public and private health insurers who have previously covered the victim's health care expenses. We use an extensive-form game to model decisions that must be made by insurers when their insured party has been injured and sues for damages. If the insurer decides to join the lawsuit, it must decide how much, if anything, it will contribute to the legal expenses of the plaintiff.

We find that that with perfect information and risk-neutral parties there is no loss of tort liability and deterrence: the parties' actions under a subrogation regime will be identical to what they would have been without subrogation. These results are somewhat counterintuitive, and in some instances may have been contradicted by the actual decisions of insurers, but are quite consistent with one remarkable development: many health insurers now take the initiative to contact the plaintiff's lawyer to inform her that they will make a payment for her services.

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1. Introduction

Before about 1960 the only persons with a direct interest in the outcome of personal injury lawsuits in the U.S. were the plaintiffs, the defendants and their lawyers. However over the last 60 years personal injury litigation has been gradually transformed by the ever-increasing use of subrogation by plaintiffs' insurance companies.

The doctrine of subrogation can best be explained by an example. Suppose X, whose health insurer is Y, is injured by a careless driver Z, and sues him for negligence. X obtains a recovery of \$500,000, representing \$300,000 in medical expenses that were previously paid by Y and \$200,000 for her lost earnings. Subrogation enables her insurer Y to step into her shoes and recover its expenditure of \$300,000 from the defendant Z who was primarily responsible, leaving X with only \$200,000 in damages. Z is still liable for full damages of \$500,000, but the insurer Y has taken \$300,000 which the plaintiff would have recovered otherwise.² Subrogation

is "an equitable doctrine under which one who has paid a debt for which he is secondarily responsible [the insurer Y, who paid Z's involuntary debt to X in advance] takes over the creditor's [X's] rights and remedies against the party primarily responsible for that debt [Z]."³

Subrogation has a long history, with its origin attributed variously to Roman civil law or Talmudic Law.⁴ In the U.S., subrogation has long been employed without controversy in the area of property casualty insurance.⁵ It was, however, not generally available to automobile and health insurance companies, because of the common law prohibitions against the assignment of personal injury claims, and the splitting of causes of action based on personal injuries.⁶ Beginning roughly in the 1960s, automobile and health insurers began to insert rights of subrogation against tortfeasors in their policies, and to press for the right of subrogation in State courts and legislatures.⁷ An argument often cited was that if the insurers had no right of subrogation, claimants would be unjustly enriched by a double recovery, from both the insurer and the tortfeasor. Here, in the absence of subrogation by Y, Ms. X would

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² For our purposes it does not matter whether the insurer proceeds against the tortfeasor or against an insured who has already collected from the tortfeasor. See [Greenblatt \(1997\)](#), 1338 at n. 9, and *Automobile Insurance Co. of Hartford v. Conlon*, 153 Conn. 415, 216 A. 2nd 828, 829 (1966): "The proposition is well established that an insurer's right to subrogation ... includes a claim against any judgment

secured by the insured against any party at fault for the amount paid by the insurer in satisfaction of the insured's damage claim..."

³ [Greenblatt \(1997\)](#), at 1338, citing [Horn \(1964\)](#), pp. 13–14.

⁴ [Greenblatt \(1997\)](#), 1339 at n. 10.

⁵ [Baron \(1992\)](#), at 582; [Trefz \(2013\)](#), at 65.

⁶ [Baron \(1992\)](#), at 583.

⁷ [Kimball and Davis \(1962\)](#), pp. 842–843; [Baron \(1992\)](#).

receive $\$300,000 + \$500,000 = \$800,000$ for an injury that cost her $\$500,000$, raising the issue of moral hazard.

When pursuing its subrogation interest, the insurer must decide how much, if anything, it will contribute to the legal expenses of the plaintiff – whether, for example, it will contribute its proportionate share of the expenses, equal to $\frac{3}{5}$ in the above example. If it decides to contribute nothing, or less than its share, there is a short-term gain, but in the long run, other of its insured parties who are injured may conclude it is not worthwhile to sue, thereby depriving the insurer of subrogation opportunities. This incentive problem was recognized by the U.S. Supreme Court in a 2013 case: “Without cost sharing, the insurer free rides on its beneficiary’s efforts – taking the fruits while contributing nothing to the labor . . . [citing a federal case] ‘If . . . injured persons could not charge legal costs against recoveries, people like [the plaintiff] would in the future have every reason’ to make different judgments about bringing suit, ‘throwing on plans the burden and expense of collection’”⁸. Moreover, a general decline in tort litigation could mean less deterrence and more careless behavior on the part of tortfeasors, resulting in an increase of claims made against the insurer. Our model deals with this conundrum.

There has been surprisingly little research by economists on the effects of subrogation on personal injury litigation. However Sykes (2001) and Polinsky and Shavell (2018) have evaluated different possible subrogation arrangements to determine which variation is an optimal contract, in the sense of maximizing the expected utility of a risk-averse consumer of insurance. Sykes, and Polinsky and Shavell, find that if insurance companies have no costs, the entire award from tort litigation should be retained by insurers; the insured party benefits through uniformly lower premiums and by avoiding the risk of litigation. Polinsky and Shavell, however, also find that if insurers have administrative costs, which of course they do, it is optimal for the insurer to pay some fraction of the award to the insured.⁹

1.1. Our contribution

Our paper takes a different tack from these contributions to the optimal-contracts literature, by using a game-theoretic framework to explore how subrogation affects the incentives of the participants and the outcome of the game. We explore the consequences of differences in the sharing of legal expenses between the plaintiff and the insurer pursuing its subrogation claim. Our model predicts the regime that will generally be preferred by insurers, and provides a theoretical explanation of a remarkable new development in their behavior in the U.S.: many health insurers now take the initiative to contact a plaintiff’s lawyer to inform her that they will make a payment for her services, to the extent she obtains a recovery for the insurer’s expenditures.¹⁰

We find that under the American rule, whereby each party pays its own legal expenses, and with perfect information, there is no loss of tort liability and deterrence: the parties’ actions under a subrogation regime will be identical to what they would have been without

the possibility of subrogation. Under the English rule, whereby the loser pays all the expenses of the winning party, we find that insurers will choose to join the plaintiff’s lawsuit but refuse to pay a share of the legal expenses whenever they can get away with it, i.e., the victim would continue to pursue the lawsuit anyway. If, however, the victim would not do so in this situation, the insurer will join the lawsuit and pay its share of expenses. Thus again, there is no loss of tort liability or deterrence. These results are not intuitively obvious, and in some cases have been contradicted by the actual decisions of insurers, as shown in the next section.

We analyze subrogation with an extensive-form game involving four players: a tortfeasor, an insured potential victim who could be injured if the tortfeasor does not take due care, her health insurance company and her lawyer. The tortfeasor must decide whether to take reasonable care, at a cost, or not to take care. If the tortfeasor decides not to take care, the insured person is injured with a specified probability. Her health insurance company will pay her medical expenses, which are part of her total damages. She must then decide whether to sue the tortfeasor. To do so, she must find a lawyer who is willing to take the case. If she finds a lawyer who decides to sue the tortfeasor on her behalf, her insurer can take one of three possible actions: (1) not to join in her lawsuit; (2) to join the lawsuit, and pay none of the legal expenses, but recover the amount it paid to its insured under her insurance policy; or (3) join the lawsuit and pay a share of the legal expenses proportionate to its share of the recovery.

1.2. What insurers have done in the U.S.

There is substantial empirical evidence for the occurrence of each of the above actions that might be taken by the insurer. With respect to action (1), the use of subrogation by insurance companies in personal injury litigation has increased tremendously in the United States over the last six decades.¹¹ However the insurer might not join the lawsuit, for example because it does not know about it. Private health insurers often lack the information about personal injury lawsuits they would need to recover amounts from defendants via subrogation. To obtain such information may require an investment in electronic data match systems, access to court docket information and other sources (Some States have dealt with this issue by enacting legislation requiring plaintiffs to notify any parties entitled to subrogation of their lawsuit, to give them an opportunity to intervene in the litigation)¹². Even if the insurer learns of the lawsuit, it may wish to do a cost-benefit analysis to determine whether intervention in the lawsuit is worthwhile.

With regard to action (2), we know that on occasion insurers plan to pay none of their share of legal expenses, or an amount that is less than their proportionate share. For example, in one federal court case¹³ an Arkansas statute gave the State the right to reimbursement for all its expenditures on Medicaid, with no deduction for attorney’s fees and other costs of procurement of the recovery. As another example, in California and South Dakota

⁸ *U.S. Airways, Inc. v. McCutchen*, 569 U.S. 88 (2013), citing *Blackburn v. Sunstrand Corp.*, 115 F. 3d 493, 496 (7th Cir. 1997).

⁹ Reinker and Rosenberg (2007), take the idea of subrogation further, proposing that victims of medical malpractice assign their entire claims to first-party insurers ex ante in exchange for lower premiums, an approach that they call “unlimited insurance subrogation.” They argue that “replacing the current amalgam of parties that make up the plaintiff’s side with the first-party insurer will eliminate the potential for conflicts that could disrupt or derail prosecution of meritorious malpractice claims.”

¹⁰ We do not know of any data set concerning overtures made by insurers to plaintiff’s lawyers, but have encountered several examples of this behavior, and personal injury lawyers we have talked to assure us that it is now commonplace.

¹¹ See Spurr (2017).

¹² As of 2016 seven States had enacted legislation requiring a plaintiff to send notice either of its claim, or of a verdict in its favor, to “all persons entitled by contract or by law to either subrogation or a lien against the proceeds of the plaintiff’s recovery.” Feeley et al. (2017); see also Schap and Feeley (2008) for the applicable rules in 2005. See, e.g., Michigan Compiled Laws Sec. 600.6303 (3): “Within 10 days after a verdict for the plaintiff, plaintiff’s attorney shall send notice of the verdict by registered mail to all persons entitled by contract to a lien against the proceeds of plaintiff’s recovery.”

¹³ *Arkansas Department of Health and Human Services v. Ahlborn*, 547 U.S. 268 (2006). The U.S. Supreme Court held that The Arkansas statute violated a provision of the federal Medicaid Law (42 U.S.C. Sec. 1396p(a)(1)) that prohibited a state from imposing liens for the amount of Medicaid payments it made.

a State agency allows attorneys 25 percent of any amount that is recovered for Medicaid,¹⁴ which is less than the usual contingent fee of one-third.¹⁵ Of course, a potential problem with action (2) is that the reduced legal fees may reduce the willingness of lawyers to sue, a problem that was recognized by the U.S. Supreme Court in *U.S. Airways, Inc. v. McCutchen*, the 2013 case mentioned above.

Finally, an example of action (3) is provided by Medicare in the U.S. When Medicare exercises its right of subrogation for its health care expenditures against a plaintiff's recovery, its claim is reduced by a proportionate share of the attorney's fees and expenses.¹⁶ Congress has dealt with the incentive problem of lawyers by effectively making the government a co-plaintiff that is fully responsible for its share of attorney fees. Thus, the plaintiff's attorney is in essentially the same position as if there were no subrogation, and her incentive to pursue the plaintiff's claim is not diminished.

We analyze the effect of subrogation under two regimes: the American rule and the English rule.

1.3. The effect of lawyers' contingent fees on the parties' actions

We must take into account that in the United States, virtually all plaintiffs with a personal injury claim hire their lawyer on a contingent fee basis,¹⁷ whereas in jurisdictions that apply the English rule, contingent fees have long been prohibited.¹⁸ Although there is some recent movement toward loosening of this restriction, it is still the general rule. Since the contingent fee prevails in the U.S., the decision whether to file a lawsuit is in reality made by the injured victim's lawyer, not the victim,¹⁹ because the lawyer is bearing all the risk of loss; the victim has a gain if she wins the lawsuit, and no consequences otherwise. However in the U.K., Germany and other jurisdictions that apply the English rule, the decision whether to sue is made by the personal injury victim rather than the lawyer, since she will bear the risk of loss.²⁰ Accordingly when we analyze the American rule, we model this decision as being made by the plaintiff's lawyer, but when we analyze the English rule, we

model it as being made by the personal injury victim. We present the model below.

2. The model

We will use the method of backward induction to determine the outcome of the game. The game has four players: the tortfeasor *T*, the victim's health insurer *I*, the victim's lawyer *L*, and the victim *V*. We assume all the parties are risk-neutral. Some might question this assumption, noting that individual plaintiffs are often risk-averse, especially when subject to the English rule. Since the winner bears no legal expenses under the English rule, while the loser pays the legal expenses of both sides, the risk (the difference between winning and losing) can be much greater. On the other hand, under the American rule with the contingent fee, it is quite reasonable to assume that the active players, i.e., the injured victim's lawyer and the insurer, are risk-neutral, and we thought it appropriate to use the assumption of risk-neutrality under the English rule to facilitate a comparison of the two cost-shifting regimes. We may also note that there is a distinct trend in the U.S. of an increase in third party litigation funding of tort cases, in which the plaintiff's action is financed by outside investors with deep pockets, which makes the risk-neutral assumption quite credible. See, e.g., [Conference Proceedings \(2010\)](#).

We first consider the effects of subrogation under the American rule. If the English rule applies, the same sequence of actions applies, except that the decision whether to sue is now made by the victim rather than the lawyer.

In Period 1, *T* must decide whether to take reasonable care. If *T* does not take care, we go to Period 2 (if *T* decides to take care, the game ends).

In Period 2, Nature determines with probability *p* whether there is an accident. An accident causes damages of *D* to *V*, part of which is medical expenses *m*. If there is an accident, we go on to Period 3 (If there is no accident, the game ends.)

In Period 3, the Insurer decides among the following three options: (1) to join the lawsuit, and pay none of the legal expenses, but recover its outlay for medical expenses *m* if the plaintiff wins; (2) not to join the lawsuit; or (3) to join the lawsuit and pay a share of the legal expenses proportionate to its share of the recovery, $\frac{m}{D}$. Since we will refer to these actions repeatedly, we use the shorthand *jnp* or "join but not pay" for action 1, *nj* or "not join" for action 2, and *jp* or "join and pay" for action 3. Under all three scenarios, the game proceeds on to Period 4.

In Period 4, the plaintiff's lawyer decides whether to sue. If she decides to sue, we go to Period 5. Otherwise the game ends.

In Period 5, Nature determines whether the lawyer wins, an event with probability *q*, and the game ends.

2.1. Under the American rule, with the plaintiff's lawyer on a contingent fee

Fig. 1 shows the sequence of possible actions that could be taken by the tortfeasor, the insurer, and the lawyer; the nodes at Nature show the actions that could be taken by Nature. The payoffs to each party are shown as ordered quadruples in the decision tree, in the order (*T*, *I*, *L*, *V*). We report the payoff to the victim, although she is not an active player, since the decision whether to sue is made by her lawyer. The payoffs of the game are calculated below in Section 2.1.1.

We will use the following notation:

L = the plaintiff's lawyer

c = the cost to the tortfeasor of due care; its cost of avoiding an accident

¹⁴ California Code Sec. 14124.72(d); *Branson v. Sharp Healthcare, Inc.*, 193 Cal. App. 4th 1467, 123 Cal. Rptr. 3d 462, 466 (2011); South Dakota Administrative Rule 67:48:04:03. In South Dakota the attorney is allowed a larger share of the recovery in certain cases, e.g., a one-third share if the amount of the award is determined through mediation, an administrative hearing, or by a trial court, and 40 cent if the amount is determined by an appellate court.

¹⁵ Clermont and Currivan (1978) state that "Accordingly, the contingent fee in personal-injury suits is most commonly 33 1/3% of the recovery, or slightly higher.... In summary, we can adequately describe the contingent fee as 33 1/3% of any recovery." *Ibid.*, 532 at n.3. See also Mackinnon (1964), at 65–66, 116–19; H.E.W. Report (1973), at 32; and Dietz et al., Appendix to H.E.W. Report (1973), at 114. Emons (2007) notes that "A common practice is to use a sliding scale: the attorney gets one-third if the case is settled without trial, 40% if the plaintiff wins at trial, and 50% if a judgment for the plaintiff is affirmed on appeal." *Ibid.* at 1.

¹⁶ 42 C.F.R. 411.37(c) (1995); *Estate of Washington*, 53 F.3d 1173, 1175 (10th Cir. 1995).

¹⁷ Kakalik and Pace (1986) found that 96% of individuals and 86% of organizations who were plaintiffs in tort litigation paid their attorneys on a contingent fee basis. Kritzer (1990) found that in the United States, plaintiffs retain their lawyer on a contingency fee basis in around 87 percent of all tort cases. See also Kritzer et al. (1985).

¹⁸ Tullock (1997), at 46, states that contingent fees are prohibited in England and Wales. Emons (2007) notes that while "In Europe contingent legal fees were strictly forbidden," market pressure has led some countries, including the U.K., to allow conditional fees, whereby the lawyer gets a premium if the case is won and nothing if the case is lost. The upscale premium is not related to the amount recovered. However conditional fees are not yet allowed in Spain, France, Italy, Portugal and Germany. *Ibid.* at 1–2. See also Kirstein and Rickman (2004).

¹⁹ See the appendix to Spurr (2017).

²⁰ In both the U.K. and Germany, the default rule subject to the insurance agreement is that the insurer and insured party share the costs of litigation proportionately, according to their respective shares of the recovery. Kean (2009), pp. 9, 12–13.

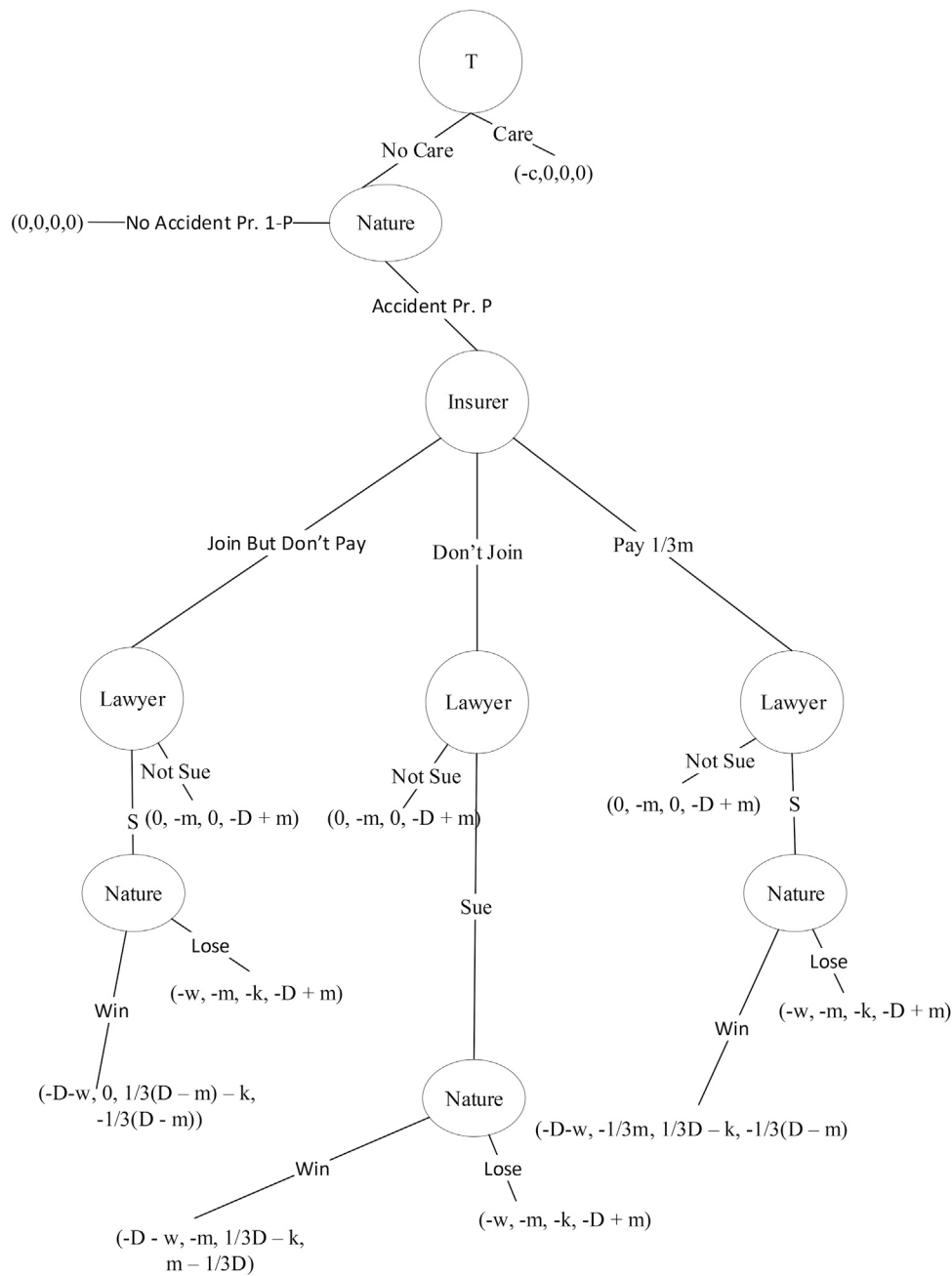


Fig. 1. Subrogation under the American rule, with contingent fee, lawyer decides whether to sue.

p = probability that an accident will occur if due care is not taken, resulting in damages of D to the insured party

k = the cost to the plaintiff's lawyer of bringing a lawsuit; the value of the lawyer's time and expenses

q = the probability that the plaintiff wins the individual lawsuit that she has filed, known by the lawyers on each side

$\frac{qD}{3} = w$ the wages of the defendant's lawyer, and the expected wages of the plaintiff's lawyer

m = the part of total damages attributable to medical expenses, which are subject to subrogation

jnp indicates that the insurer joins the victim's lawsuit, but does not pay its share of legal expenses

nj indicates that the insurer does not join the victim's lawsuit

jp indicates that the insurer joins the victim's lawsuit, and pays its share of legal expenses

We assume in effect that the lawyers for the plaintiff and the defendant do an equal amount of work on a case, and in a competitive market where the lawyer for each side has the same type of skills, they have the same expected wage. Kritzer (1995, 1998) provides empirical support for this assumption.²¹

The plaintiff's lawyer receives $\frac{1}{3}D$ with probability q , the probability of winning the case, and otherwise 0, while in each case the defendant's lawyer is paid a certain amount $w = \frac{qD}{3}$.

²¹ Brickman (2003) states that: "Indeed, Kritzer is the leading proponent of the position that the effective hourly rates of return of plaintiff attorneys are substantially the same as those realized by hourly rate lawyers in similar matters and is widely cited for that proposition [providing extensive citations]." pp. 662–663 at n.17.

2.1.1. Calculating the payoffs of the game

If the tortfeasor decides to take reasonable care, the payoff vector is $(-c, 0, 0, 0)$. If the tortfeasor decides not to take reasonable care, but there is no accident (an outcome that occurs with probability $1 - p$), the payoff vector will be $(0, 0, 0, 0)$.

In the remainder of the paper we consider what happens if the tortfeasor does not take care, which results in an accident, causing damages of D . In this case the next move is made by the victim's insurer. We divide the calculation of payoffs of the parties into three subsections. In the first subsection, we calculate the payoffs if the insurer decides to join the lawsuit, but refuses to pay any of the plaintiff's legal expenses (scenario *jnp*). In the next subsection we determine the payoffs if the insurer decides not to join the plaintiff's lawsuit (*nj*). Finally, in the third subsection, we calculate the payoffs if the insurer decides to join the lawsuit and pay its proportionate share of the legal expenses (*jp*). The payoffs are shown in Fig. 1, moving from the far left (*jnp*) to the middle (*nj*) to the right (*jp*).

The Insurer Decides to Join the Lawsuit, but Pay None of its Legal Expenses (*jnp*)

If the victim wins. We first consider scenario *jnp*. Suppose the lawyer decides to sue. If she wins, T has a payoff of $(-D - w)$ representing the sum of the damages, D and the legal expenses it must pay its lawyer, w ; the insurer has a payoff of 0, because it has been fully reimbursed for its payment to V of m via subrogation, and pays none of the legal expenses. Meanwhile the plaintiff's lawyer L has a payoff of $\frac{1}{3}(D - m) - k$, where k is the investment of time by the lawyer. We are assuming that the lawyer's investment of time does not change whether the victim's potential recovery is D or $D - m$.²² We also assume that the compensation of the plaintiff's lawyer equals $\frac{1}{3}$ of the net recovery she obtains for the victim.²³ The components of the payoff to V are $-D$ (the damage caused by the accident) $+m$ (the insurer's payment of her medical expenses) $+D$ (the recovery of damages from T) $-m$ (the amount recovered by the insurer via subrogation) $-\frac{1}{3}(D - m)$ (the legal expenses, borne entirely by V). Therefore the net payoff to $V = -\frac{1}{3}(D - m)$. Thus under our assumptions the payoff vector will be $(-D - w, 0, \frac{1}{3}(D - m) - k, -\frac{1}{3}(D - m))$. This is shown at the far left branch of the decision tree.

If the victim loses. Otherwise, if L loses, the payoff vector is $(-w, -m, -k, -D + m)$. $-w$ represents a payoff of 0 to the victim minus the tortfeasor's legal expenses. $-m$ is the payment by the insurer for medical expenses, while $-k$ is the lawyer's investment of time in the case. The lawyer gets nothing when she loses since she is on a contingent fee basis. The payoff to V , since she bears no legal expenses, is $-D$ (the damage caused by the accident) $+m$ (the insurer's payment of her medical expenses) $= -D + m$.

If the lawyer does not sue. Now suppose the lawyer does not sue. In this case the payoff vector is $(0, -m, 0, -D + m)$.

The Insurer Decides Not to Join the Lawsuit (*nj*) Now we calculate the payoffs in the middle branch of the tree, under scenario *nj*. Suppose the lawyer decides to sue.

If the victim wins. If L wins, T again has a payoff of $-D - w$; I has a payoff of $-m$. Meanwhile L has a payoff of $\frac{1}{3}D - k$, since the victim will collect full damages of D . The payoff to V is $-D$ (the damage caused by the accident) $+m$ (the insurer's payment of her medical expenses) $+D$ (the recovery of damages from T) $-\frac{1}{3}D$ (the legal

expenses, borne entirely by V) $= m - \frac{1}{3}D$. Thus the payoff vector is $(-D - w, -m, \frac{1}{3}D - k, m - \frac{1}{3}D)$.

If the victim loses. If, on the other hand, L loses, the payoff vector is again $(-w, -m, -k, -D + m)$.

If the lawyer does not sue. In this case the payoff vector is $(0, -m, 0, -D + m)$.

The Insurer Decides to Join the Lawsuit, and Pay its Share of the Legal Expenses (*jp*) We now move to the right branch of the tree, scenario *jp*. We assume the insurer, as well as the victim, has a contingent fee arrangement with the victim's lawyer.

If the victim wins. Suppose the lawyer decides to sue. If she wins, T again has a payoff of $-D - w$, while I has a payoff of $-m + m - \frac{1}{3}m = -\frac{1}{3}m$. L has a payoff of $\frac{1}{3}D - k$, since the lawyer will collect her fees from both the victim and the insurer. The payoff to V is $-D$ (the damage caused by the accident) $+m$ (the insurer's payment of her medical expenses) $+D$ (the recovery of damages from T) $-m$ (the amount recovered by the insurer via subrogation) $-\frac{1}{3}(D - m)$ (the legal expenses borne by V) $= -\frac{1}{3}(D - m)$. Thus the payoff vector is $(-D - w, -\frac{1}{3}m, \frac{1}{3}D - k, -\frac{1}{3}(D - m))$.

If the victim loses. Otherwise, if L loses, the payoff vector is $(-w, -m, -k, -D + m)$.

If the lawyer does not sue. In this case the payoff vector is $(0, -m, 0, -D + m)$.

Solving the Game by Backward Induction To analyze the game, and determine the decision in any of the decision nodes, we start at the bottom of the tree and move upward via backward induction.²⁴

The Expected Outcome of the Trial at the Level of Nature We start at the left branch of the decision tree. If there is a lawsuit, the expected payoff vector for (join but do not pay) is $[q(-D - w, 0, \frac{1}{3}(D - m) - k, -\frac{1}{3}(D - m)) + (1 - q)(-w, -m, -k, -D + m)]$ which $= -Dq - w$ for the tortfeasor. For the insurer it is $-m(1 - q)$. For the plaintiff's lawyer it is $(\frac{1}{3}q(D - m)) - k$. For the victim it is $\frac{2}{3}q(D - m) - D + m$. So the payoff vector is $(-Dq - w, -m(1 - q), \frac{1}{3}q(D - m) - k, \frac{2}{3}q(D - m) - D + m)$.

The expected payoff vector for (do not join) is $[q(-D - w, -m, \frac{1}{3}D - k, m - \frac{1}{3}D) + (1 - q)(-w, -m, -k, -D + m)] = -Dq - w$ for the tortfeasor. For the insurer it is $-m$. For the plaintiff's lawyer it is $\frac{1}{3}Dq - k$. For the victim it is $\frac{2}{3}Dq - D + m$. So the payoff vector is $(-Dq - w, -m, \frac{1}{3}Dq - k, \frac{2}{3}Dq - D + m)$.

Finally, the expected payoff vector for (join and pay its share of expenses) is $q(-D - w, -\frac{1}{3}m, \frac{1}{3}D - k, -\frac{1}{3}(D - m)) + (1 - q)(-w, -m, -k, -D + m) = -Dq - w$ for the tortfeasor. For the insurer it is $m(\frac{2}{3}q - 1)$. For the plaintiff's lawyer it is $\frac{1}{3}Dq - k$. For the victim it is $\frac{2}{3}q(D - m) - D + m$. So the payoff vector is $(-Dq - w, m(\frac{2}{3}q - 1), \frac{1}{3}Dq - k, \frac{2}{3}q(D - m) - D + m)$.

The Lawyer's Decision Whether to Sue We determined above that the lawyer's payoff will be 0 under all three scenarios if there is no lawsuit. Recall that at the level of Nature, the plaintiff's lawyer's expected payoff for the *jnp* scenario $= \frac{1}{3}q(D - m) - k$. For scenario *nj*, the lawyer's expected payoff $= \frac{1}{3}qD - k$. Her expected payoff is also $\frac{1}{3}qD - k$ under scenario *jp*. Thus the expected payoff for the lawyer under *jnp* is less than under *nj* and *jp* by the amount $\frac{1}{3}mq$. Therefore we must consider three different possible conditions:

Condition 1. If $\frac{1}{3}qD - k < 0$, then the lawyer would never sue under any of the three scenarios, since the payoff from not suing is larger.

Condition 2. If $\frac{1}{3}q(D - m) - k < 0 < \frac{1}{3}qD - k$, i.e., the victim's share of damages $D - M < \frac{3k}{q}$, then the lawyer will decide to sue under either scenario *nj* or *jp*, but not *jnp*.

Condition 3. If $\frac{1}{3}q(D - m) - k > 0$, then the lawyer will decide to sue under any of the three scenarios: *jnp*, *nj* or *jp*.

²² This assumption is reasonable given that the plaintiff's lawyer must still prove liability, and that there is a large fixed cost entailed in learning about the facts of the case and preparing for trial.

²³ An alternative possible assumption that we do not make is that the lawyer deducts from the victim's recovery $\frac{1}{3}$ of the entire recovery of D , even though the victim receives only $(D - m)$. We have seen no evidence that this happens in practice in the U.S.

²⁴ We take the expected value of the actions taken by Nature.

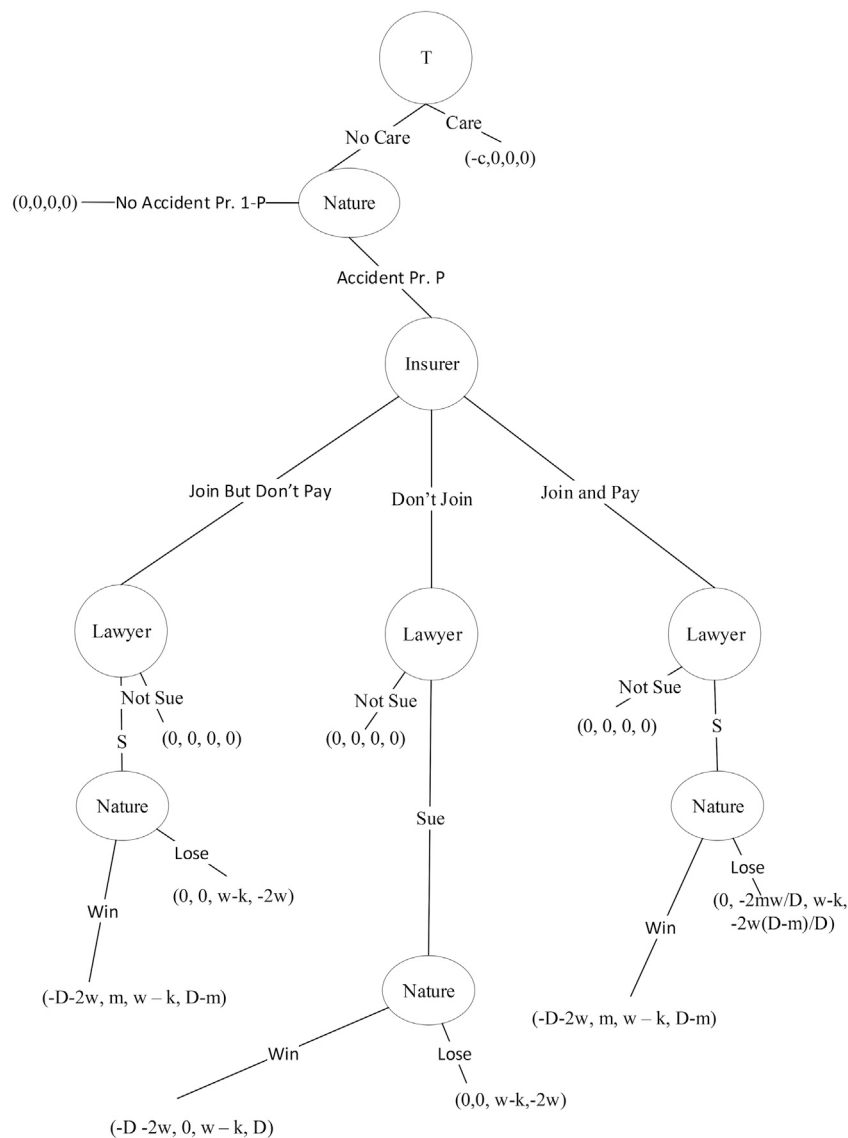


Fig. 2. Subrogation under the English rule, without contingent fee, victim decides whether to sue (case 1).

The Choice Made by the Insurer Now we need to consider the choice among the three scenarios that will be made by the insurer.

If Condition 1 applies, the insurer has no decision to make.

If Condition 2 applies, the insurer would get $-m$ under jnp , since there will be no lawsuit under this alternative. Under nj , the insurer also gets $-m$, while under jp , the insurer gets $-m(1 - \frac{2}{3}q)$, which is clearly greater than $-m$. Therefore the insurer will always choose to join and pay its share of expenses under condition 2.

If Condition 3 applies, under jnp the insurer gets $(1-q)(-m) = -m + mq$. Under nj the insurer gets $-m$, and under jp , $-m(1 - \frac{2}{3}q)$. Since the insurer's payoff under jnp is greater than its payoff under jp by $\frac{1}{3}mq$, the insurer will always choose to join but not pay.

The Choice Made by the Tortfeasor Under Condition 1, the tortfeasor does not take care, since there is no lawsuit.

Suppose Condition 2 applies. Note that the expected payoff to the tortfeasor if it does not take care, given that an accident occurs and the insurer chooses jp , is $q(-D - w) + (1-q)(-w) = -Dq - w$. Since the probability of an accident occurring is p , the expected payoff to the tortfeasor if it does not take care is $-p(Dq + w)$. Thus the tortfeasor will take care if $c < p(Dq + w)$. The tortfeasor is more likely to take care, the greater the probability of an accident, the

damages from an accident, the probability that the plaintiff's lawyer will win a lawsuit if it does not take care, and the larger the costs of defending the lawsuit.

Now suppose Condition 3 applies, so the insurer chooses scenario jnp . Since by assumption $\frac{1}{3}q(D - m) - k > 0$, obviously $\frac{1}{3}qD > k$. Now the expected payoff to the tortfeasor if it does not take care and an accident occurs is again $-Dq - w$. Thus the expected payoff if it does not take care is $-p(Dq + w)$. Therefore the tortfeasor will take care if $c < p(Dq + w)$. On the other hand if there were no subrogation, the lawyer would take the case if $\frac{1}{3}qD > k$, and the tortfeasor would take care if $c < p(Dq + w)$.

Theorem: Under the American rule the parties' actions under a subrogation regime will be identical to what they would have been without the possibility of subrogation.

2.2. Under the English rule, with no contingent fee arrangement for the plaintiff

Now suppose the English rule is in effect, so that the loser of a lawsuit pays all the winner's litigation expenses. The new payoff quadruples are shown in Fig. 2. We again assume that the tortfeasor does not take due care, and that there is an accident, causing dam-

ages of D . Now, however, there is no contingent fee arrangement, and the decision whether to sue is made by the victim, rather than by her lawyer. Under these circumstances plaintiffs' and defendants' lawyers would receive the same payment for their legal services, w . We have put the proofs for this section in the appendix, and summarize our findings here.

Analysis of the payoffs to all parties is straightforward for two strategies of the insurer: "don't join" and "join and pay its share of the legal expenses." Under the English rule without the possibility of subrogation, there is a critical probability of winning $q = \frac{2w}{D+2w}$ that determines whether the victim will sue. That critical probability is the same with the possibility of subrogation, and turns out to be identical under both the "don't join" and "join and pay" strategies. Thus there is no gain or loss of deterrence under these strategies when subrogation becomes possible. We also find that if it is worthwhile for the victim to sue under nj or jp , it is worthwhile for the insurer to join the lawsuit because its expected gain is positive. That is, the insurer will join the case whenever it has a subrogation claim; the insurer will never choose the strategy nj .

However we must also consider the insurer's third option, "join but don't pay." We assume the insurer need not contribute to the plaintiff's legal expenses if she wins. Now, however, the question arises whether the insurer can avoid liability to the defendant if the plaintiff loses. Therefore we consider two mutually exclusive alternatives:

(1) The insurer can exercise its right of subrogation without paying anyone, and (2) the insurer can avoid paying any legal expenses if the plaintiff wins, but not its proportionate liability to the defendant if the plaintiff loses.

In case 1, the victim recovers $D - m$ if she wins, and must pay $2w$ if she loses, since she must pay both her own lawyer and all the legal expenses of the defendant.

In case 2, the victim recovers $D - m$ if she wins, and must pay $w + \frac{(D-m)w}{D}$ if she loses. The first term represents her liability to her own lawyer, and the second term her share of liability for the legal expenses of the defendant.

We find that the critical q in case 2 is greater than the q that applies under nj or jp , and the critical q of case 1 is still larger, i.e., larger than the q of case 2. In either case 1 or case 2, whichever applies, we find that insurers will choose jp only when the victim would pursue the lawsuit anyway, namely the victim's q is sufficiently high for her expected gain from litigation to be positive. If, however, the victim's q is not this high, the insurer will join the lawsuit and pay its share of expenses rather than have the plaintiff abandon the lawsuit. Consequently, we conclude that under the English rule, the introduction of subrogation will not reduce tort liability or deterrence.

3. Discussion and conclusion

We used an extensive-form game to model the decision to be made by insurers when their insured party has been injured, and finds a lawyer who is willing to sue the wrongdoer for damages. The insurer has three possible actions: (1) not to join the lawsuit filed on behalf of the insured party; (2) to join the lawsuit, but pay none of the legal expenses, and recover its outlay for medical expenses if the plaintiff wins; or (3) join the lawsuit and pay a share of the legal expenses proportionate to its share of the recovery. Our model explores the consequences of these differences in the sharing of legal expenses between the plaintiff and the insurer pursuing its subrogation interest. These differences are crucial in determining whether subrogation will or will not lead to a reduction of the willingness of lawyers to bring lawsuits, and a resulting general decline in tort liability and deterrence of tortfeasors. The model assumes risk-neutrality and full information. It provides a solution for the outcome of the game, given information about the parameters c , p ,

q , m , D and k , which should either be available, or capable of being estimated, by the plaintiff's lawyer and the other players.

We find that under the combination of the American rule and contingent fee, insurers will not adopt the strategy of joining the plaintiff's lawsuit and refusing to pay their share of the plaintiff's legal expenses. With perfect information there is no loss of tort liability and deterrence: the parties' actions under a subrogation regime will be identical to what they would have been without the possibility of subrogation. Given this fact, the introduction of subrogation is not likely to reduce lawsuits for personal injuries even though it will reduce the amounts paid to individual plaintiffs²⁵, because it will not reduce the amounts paid to the plaintiff's lawyers²⁶, and under the American rule and contingent fee they, rather than their clients, are making the decision whether to sue or not. If one believes that the current tort system in the U.S. provides optimal, or reasonably close to optimal, levels of tort liability and deterrence, one may conclude that the practice of subrogation will not reduce the benefits of the system substantially.

Under the English rule, and without the contingent fee, the analysis is similar to that for the American rule, *mutatis mutandis*. However, with respect to the "join but don't pay" option, we had to consider two possibilities: (1) the insurer can recover its subrogation interest without paying anyone, or (2) the insurer can avoid paying any legal expenses if the plaintiff wins, but not its proportionate liability to the defendant if the plaintiff loses. We find that insurers will choose to join the plaintiff's lawsuit but refuse to pay a share of the legal expenses any time that conditions are sufficient for the victim to pursue the lawsuit anyway, namely the victim's probability of winning is sufficiently high. If, however, the victim's probability of success is not high enough, the insurer will join the lawsuit and pay its share of expenses rather than have the plaintiff abandon the lawsuit. Consequently, we again find no reduction of tort liability or deterrence. We also found that the insurer will exercise its right of subrogation whenever the victim sues; the insurer will never choose the "don't join" strategy.

Finally, we consider whether the tortfeasor will choose a higher level of care under the English or American rule. We find that the English rule will induce a higher level of care if and only if the plaintiff's probability of winning the case is greater than $\frac{1}{2}$.

Our results are consistent with a remarkable new development in the United States with the growth of subrogation. As noted above, many health insurers now take the initiative to contact the plaintiff's lawyer to inform her that they will make a payment for her services, to the extent she obtains a recovery for medical expenses.

Appendix A. Under the English rule, with no contingent fee arrangement for the plaintiff

The analysis of the English rule is along the same lines as the American rule, except that because there is no contingent fee arrangement, the plaintiff, rather than her lawyer, decides whether to sue. Under these circumstances plaintiffs' and defendants' lawyers would receive the same payment for their legal services, w . The new payoff quadruples are shown in Fig. 2. In this section we again assume that the tortfeasor does not take due care, and that there is an accident, causing damages of D . We also report the payoff to the lawyer, even though she is now not an active player. We begin with the analysis of the "join but don't pay" option.

²⁵ Under jp the expected payoff to the victim is $\frac{2}{3}q(D - m) - D + m$, whereas under nj it is $\frac{2}{3}Dq - D + m$. Thus the pre-subrogation expected payoff to the victim is larger by $\frac{2}{3}mq$.

²⁶ Under both jp and nj the lawyer's expected payoff is $\frac{1}{3}Dq - k$.

A.1 The insurer decides to join the lawsuit, but pay none of its legal expenses

Things are a little more complicated under the English rule with scenario *jnp*. One question is whether an insurer who desires to join the lawsuit without paying can avoid liability to the defendant if the plaintiff loses the case. Therefore we consider two alternatives:

(1) the insurer can exercise its right of subrogation without paying anyone, and (2) the insurer can avoid paying any legal expenses if the plaintiff wins, but not its proportionate liability to the defendant if the plaintiff loses.

In case 1, the victim recovers $D - m$ if she wins, and must pay $2w$ if she loses, since she must pay both her own lawyer and all the legal expenses of the defendant. The insurer has m if the victim wins, and 0 if the victim loses.

In case 2, the victim recovers $D - m$ if she wins, and must pay $w + \frac{(D-m)w}{D}$ if she loses. The first term represents her liability to her own lawyer, and the second term her share of liability for the legal expenses of the defendant. The insurer has m if the victim wins, and has $-\frac{mw}{D}$ if the victim loses.

In either case 1 or case 2, with respect to the tortfeasor, its payoff is $-D - 2w$ if the victim wins, and 0 if the victim loses. This is because if the victim wins, T is liable not only for damages of D but also for its own expenses of w and the victim's legal expenses (since there is no contingent fee) of w . With respect to the lawyer, her payoff is $w - K$ whether the victim wins or loses.

If the victim does not sue. Now suppose the victim does not sue. In this case the payoff vector is $(0, 0, 0, 0)$. The tortfeasor has no liability for its failure to exercise due care. The payoff to the insurer is 0. The plaintiff's lawyer does nothing, and gains nothing.

A.1.1 The insurer decides not to join the lawsuit

If the victim wins. With regard to the middle "not join" node, the payoff to the tortfeasor if the victim wins the lawsuit is the sum of its damages and the legal expenses of itself and the victim, $-D - 2w$. Here the insurer's payoff is 0 since it did not join the lawsuit, and will not be able to obtain subrogation. The payoff to the plaintiff's lawyer is $w - K$. The victim's payoff will be D . Thus the payoff quadruple would be $(-D - 2w, 0, w - K, D)$.

If the victim loses. If the victim loses the lawsuit, the payoff for T would be 0 because its legal expenses would be reimbursed. The payoff to the insurer would be 0 since it is not participating in the lawsuit. The payoff to the plaintiff's lawyer is $w - K$. The payoff to the victim would be $-2w$. Thus the payoff quadruple would be $(0, 0, w - K, -2w)$.

A.1.2 The insurer decides to join the lawsuit, and pay its share of the legal expenses

If the victim wins. With regard to the plaintiff's winning fork on the far right, (the "join and pay its share of expenses" node), the payoff to the tortfeasor will be $-D$ plus the legal expenses of itself and the victim, for a total of $-D - 2w$. The payoff to the insurer, since all its legal expenses of $\frac{mw}{D}$ will be paid by the defendant, will be m . The payoff to the plaintiff's lawyer is $w - K$. The payoff to the victim will be $D - m$. Thus the payoff quadruple would be $(-D - 2w, m, w - K, D - m)$.

If the victim loses. If the victim loses the lawsuit, the payoff for T would be 0 because its legal expenses would be reimbursed. The payoff to the insurer would be $-\frac{mw}{D}$ (its share of the plaintiff's legal expenses) $-\frac{mw}{D}$ (its share of the defendant's legal expenses) $= -\frac{2mw}{D}$. The payoff to the plaintiff's lawyer is $w - K$. The payoff to the victim would be $-w \left(\frac{D-m}{D}\right)$ (its own legal expenses) $-w \left(\frac{D-m}{D}\right)$ (payment of its share of T 's legal expenses) $= -2w \left(\frac{D-m}{D}\right)$. Thus the payoff vector would be $(0, -\frac{2mw}{D}, w - K, -2w \left(\frac{D-m}{D}\right))$.

A.2 At the level of nature (for determining the expected outcome of the trial)

A.2.1 Join but do not pay

As we noted previously, if there is a lawsuit, the expected payoff vector for (join but do not pay) must be divided into two cases.

A.2.2 Case 1

$(q(-D - 2w, m, w - K, D - m)) + (1 - q)(0, 0, w - K, -2w)$. This yields an expected payoff of $q(-D - 2w)$ for the tortfeasor, qm for the insurer, $w - K$ for the lawyer, and $q(D - m) - (1 - q)(2w)$ for the victim. So the expected payoff vector will be $(q(-D - 2w), qm, w - K, q(D - m) - (1 - q)(2w))$.

A.2.3 Case 2

$(q(-D - 2w, m, w - K, D - m)) + (1 - q)(0, -\frac{mw}{D}, w - K, -2w)$. This yields an expected payoff of $q(-D - 2w)$ for the tortfeasor, $qm - (1 - q)\frac{mw}{D}$ for the insurer, $w - K$ for the lawyer, and $q(D - m) - (1 - q)(2w)$ for the victim. So the expected payoff vector will be $(-q(D + 2w), qm - (1 - q)\frac{mw}{D}, w - K, q(D - m) - (1 - q)(2w))$.

A.2.4 Do not join

The expected payoff vector for (do not join) is $q(-D - 2w, 0, w - K, D) + (1 - q)(0, 0, w - K, -2w)$. This yields expected payoffs of $q(-D - 2w)$ for the tortfeasor, 0 for the insurer, and $qD + (1 - q)(-2w)$ for the victim. So the payoff vector is $(-q(D + 2w), 0, w - K, qD + (1 - q)(-2w))$.

A.2.5 Join and pay

Finally, the expected payoff vector for (join and pay its share of expenses) is $q(-D - 2w, m, w - K, D - m) + (1 - q)(0, -\frac{2mw}{D}, w - K, -2w \left(\frac{D-m}{D}\right))$. This yields expected payoffs of $q(-D - 2w)$ for the tortfeasor, $qm - (1 - q)\left(\frac{2mw}{D}\right)$ for the insurer, $w - K$ for the lawyer, and $q(D - m) + (1 - q)\left(-2w \left(\frac{D-m}{D}\right)\right)$ for the victim. So the payoff vector will be $(q(-D - 2w), qm - (1 - q)\left(\frac{2mw}{D}\right), w - K, q(D - m) + (1 - q)\left(-2w \left(\frac{D-m}{D}\right)\right))$.

A.3 Whether the victim will decide to sue

A.3.1 Do not join

We begin with the analysis of scenario *nj*, because it is the simplest one. If the victim wins, she gets D , and if she loses, she gets $-2w$. Thus she will sue if $qD + (1 - q)(-2w) \geq 0$. She will be indifferent whether to sue if $qD - 2w + 2wq = 0 \Rightarrow q = \frac{2w}{D+2w}$. If

$$q > \frac{2w}{D+2w} \quad (1)$$

the victim will sue. If $q < \frac{2w}{D+2w}$ the victim will not sue. We note that the critical q increases with w since $\frac{dq}{dw} = \frac{2D}{D+4w^2} > 0$ and that its second derivative $\frac{d^2q}{dw^2} = \frac{-8wd}{D+4w^2} < 0$.

A.3.2 Join and pay

In this case the victim will sue if her expected net recovery

$$q(D - m) + (1 - q)\left(\frac{-2(D - m)w}{D}\right) \geq 0. \quad (2)$$

This will be true if $qD - qm - \frac{2(D-m)w}{D} + \frac{2q(D-m)w}{D} \geq 0 \Rightarrow qD - qm - \frac{2Dw}{D} + \frac{2mw}{D} + \frac{2qDw}{D} - \frac{2qmw}{D} \geq 0 \Rightarrow qD^2 - qmD - 2Dw + 2mw + 2qDw - 2qmw \geq 0 \Rightarrow q(D^2 - mD + 2Dw - 2mw) \geq 2Dw - 2mw \Rightarrow$

$$q > \frac{2w(D - m)}{D^2 - mD + 2w(D - m)} \quad (3)$$

Note that the critical q of inequality (3) is the same as in inequality (1). You obtain (3) from (1) by multiplying its numerator and denominator by $D - m$. Thus if it is worthwhile for the victim to sue under nj , it is worthwhile to sue under jp .

If $q < \frac{2w(D-m)}{D^2 - mD + 2w(D-m)}$ she will not sue.

Note also that if it is worthwhile for the victim to sue under nj or jp , it is worthwhile for the insurer to join the lawsuit because its expected gain $qm + (1 - q)(\frac{-2mw}{D})$ is positive. This follows if we simply multiply inequality (2) by $(\frac{m}{D-m})$

A.3.3 Join but do not pay

Again we must deal with two cases.

In case 1, the victim recovers $D - m$ if she wins, and must pay $2w$ if she loses.

In case 2, the victim recovers $D - m$ if she wins, and must pay $w + \frac{(D-m)w}{D}$ if she loses.

Case 1: the insurer exercises its right of subrogation without paying anyone The victim will sue only if $q(D - m) + (1 - q)(-2w) > 0 \Rightarrow qD - qm - 2w + 2wq > 0 \Rightarrow$

$$q > \frac{2w}{D - m + 2w} \quad (4)$$

The critical q here is clearly greater than the q that applies under jp , because the critical q under case 1 can be written as $\frac{2wD}{D^2 - mD + 2wD}$, while the q under nj or jp is $\frac{2wD - 2wm}{D^2 - mD + 2wD - 2wm}$. The difference is that in the q under jp , $2wm$ is subtracted from the numerator and denominator of the q under case 1, and $2wm$ is a larger proportion of the numerator than it is of the denominator. If $q > \frac{2w}{D - m + 2w}$ she will not sue.

Case 2: the insurer pays no legal expenses if the plaintiff wins, but must pay its proportionate liability to the defendant if the plaintiff loses The victim will sue only if $q(D - m) + (1 - q)(-w - \frac{w(D-m)}{D}) > 0 \Rightarrow qD - qm - w - \frac{w(D-m)}{D} + wq + \frac{wq(D-m)}{D} > 0 \Rightarrow qD - qm + wq + \frac{wq(D-m)}{D} > w + \frac{w(D-m)}{D}$

$$\Rightarrow qD^2 - qmD + wqD + wqD - wqm > wD + wD - wm \Rightarrow q > \frac{w(2D - m)}{D(D - m + 2w) - wm} \quad (5)$$

Note that inequality (4), showing the critical q of case 1, can be rewritten as $q = \frac{2wD}{D(D - m + 2w)}$. If we compare this with inequality (5), the critical q of case 2 above, we see that the difference is that in (5), wm is subtracted from both the numerator and denominator of case 1. Yet wm is a larger fraction of the numerator than the denominator of case 1, since we are comparing $\frac{wm}{2wD}$ to $\frac{wm}{D^2 - mD + 2wD}$. Therefore it is clear that the critical q (the q that the victim requires to justify a lawsuit) is lower for jnp case 2 than for its case 1. Since the victim's expected gain from a lawsuit is less under case 1 than under case 2, the victim requires a higher q in case 1.

We may also compare the critical q of case 2, $\frac{w(2D - m)}{D(D - m + 2w) - wm}$, to the critical q of jp , $\frac{2w(D - m)}{D^2 - mD + 2w(D - m)}$. We note that we can obtain the critical q of case 2 simply by adding wm to both the numerator and denominator of the critical q of jp , but wm is a larger proportion of the numerator than of the denominator. If we compare $\frac{wm}{2wD - 2wm}$ to $\frac{wm}{D^2 - mD + 2wD - 2wm}$, we see that the right-hand side has an additional positive amount, $D^2 - mD$, in the denominator. Therefore the critical q for case 2 (and therefore case 1) is higher than the critical q for nj and jp .

A.3.4 The choice made by the insurer

Case 1. If $\frac{2w}{D + 2w} < q$, the victim will sue under nj or jp , since the critical q for them is the same. Suppose $\frac{2w}{D + 2w} < q < \frac{2w}{D - m + 2w}$ so that

q is less than the critical q of case 1. The insurer will not choose jnp . Since the victim will not sue in this case. Also under nj , the insurer would have no expected gain. However under jp the insurer would have a positive expected payoff of $qm + (1 - q)(\frac{-2mw}{D})$. Thus in this case the insurer will choose jp .

If $q > \frac{2w}{D - m + 2w}$ the insurer would choose jnp , with an expected payoff of qm , rather than jp , with its expected payoff of $qm - (1 - q)(\frac{2mw}{D})$.

Case 2

If $\frac{2w}{D + 2w} < q$, the victim will sue under either nj or jp . Suppose $\frac{2w}{D + 2w} < q < \frac{w(2D - m)}{D(D - m + 2w) - wm}$ so that q is less than the critical q of case 2. Since the victim will not sue under jnp . Under nj , the insurer would have no expected gain. However under jp the insurer would have a positive expected payoff of $qm + (1 - q)(\frac{-2mw}{D})$. Therefore in this case the insurer will also choose jp .

If $q > \frac{w(2D - m)}{D(D - m + 2w) - wm}$ the insurer would choose jnp with an expected payoff of $qm - (1 - q)\frac{mw}{D}$, rather than jp , with an expected payoff of $qm - (1 - q)(\frac{2mw}{D})$.

A.3.5 The choice made by the tortfeasor

Case 1 If $q < \frac{2w}{D + 2w}$, the tortfeasor will not be sued.

If $\frac{2w}{D + 2w} < q < \frac{2w}{D - m + 2w}$, the tortfeasor would be sued under jp , with the lawsuit financed by both victim and insurer.

If $q > \frac{2w}{D - m + 2w}$, the tortfeasor would be sued under jnp , with the lawsuit financed wholly by the victim.

Case 2 If $q < \frac{2w}{D + 2w}$, the tortfeasor will not be sued.

If $\frac{2w}{D + 2w} < q < \frac{w(2D - m)}{D(D - m + 2w) - wm}$, the tortfeasor would be sued under jp , with the lawsuit financed by both victim and insurer.

If $q > \frac{w(2D - m)}{D(D - m + 2w) - wm}$, the tortfeasor would be sued under jnp , with the lawsuit financed primarily by the victim (the insurer would be forced to contribute only if the plaintiff lost the case).

Conclusion: under the English rule the tortfeasor would be sued under the same conditions that it would have been sued in the absence of subrogation.

A.3.6 Deterrence

Note that the expected payoff to the tortfeasor if it does not take care, given that an accident occurs and the insurer chooses any strategy, is $q(-D - 2w)$. Since the probability of an accident occurring is p , the expected payoff to the tortfeasor if she does not take care is $pq(-D - 2w)$. Thus the tortfeasor will take care if $-c > pq(-D - 2w)$ or $c < pq(D + 2w)$. Again the tortfeasor is more likely to take care, the greater the probability of an accident, the damages from an accident, and the probability that the plaintiff's lawyer will win a lawsuit if it does not take care.

Recall that it pays the tortfeasor to take care under the American rule if $c < p(Dq + w)$ and under the English rule if $c < pq(D + 2w)$. Thus the English rule will induce tortfeasors to take care up to a higher level if $pq(-D - 2w) < -p(Dq + w)$ or $q > \frac{1}{2}$. If, on the other hand, $q < \frac{1}{2}$, tortfeasors will choose a higher level of care under the American rule.

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