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THE EFFICIENCY IMPLICATIONS OF COST SHIFTING RULES

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Abstract

This paper uses a model of legal disputes arising from unilateral accidents to examine the consequences of different cost shifting rules on the offers made by defendants, the settlement probability, the care taken by defendants, the accident probability and post and pre-accident expected utility of defendants and plaintiff. It brings out in a transparent way the importance of the beliefs of the parties about the probability that the plaintiff will win his case and confirms Shavell's (1982) results in a model with endogenous settlement offers and probabilty of settlement. The welfare implications of cost shifting rules are examined in a simplified version of the model in which the parties have identical probability beliefs. It is shown that because cost shifting rules transfer costs between the parties and do not alter the total litigation costs they bear the first best may not be achievable by any cost shifting rule. However it is possible to use taxes and subsidies to litigants to correct the inefficiencies arising from the fact that litigation is costly and imperfect.

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1. INTRODUCTION

Litigation costs are a significant proportion of awards[1] made at trials and a variety of rules for allocating these costs between litigants are used or have been proposed. Costs shifted under the rules alter the plaintiff's net proceeds from a trial and the defendant's net payments. Consequently they can change the parties' decisions before a trial and have significant resource implications as well as transfer effects. Trials occur if there is a dispute which the parties do not settle by other means. Both the number of disputes and the likelihood of a trial given that a legal dispute has arisen will be affected by the parties' behaviour and thus by the litigation cost rules.

There is little consensus on which rule is best. This is in part because the rules can be assessed by a variety of criteria, such as whether they encourage or discourage the parties to settle before trial, whether they increase or reduce the payments by the defendant to the plaintiff and whether they increase or reduce the number of legal disputes. It is also partly due to different model specifications leading to different predictions about the effects of effects of the rules.

The pioneering models of legal disputes [Gould (1972), Posner (1973), Shavell (1982)] focus on the settlement range: the difference between the maximum offer the defendant would be willing to make rather than go to trial and the plaintiff's minimum acceptable offer. In these models it is assumed that the probability of settlement increases with the size of the settlement range. Shavell (1982) shows that, compared to the American rule that parties bear their own costs, the British "loser pays" rule increases or reduces the settlement range depending on whether the plaintiff or the defendant attaches the larger probability to the plaintiff winning. Settlement range models do not give any explicit account of settlement terms or why the parties may fail to settle. Without a formal account of the bargaining process one cannot be sure that the intuitively plausible results from settlement range models hold up once account is taken of the possibilty that cost allocation rules alter bargaining strategies as well as the settlement range.

More recent models of legal disputes [Bebchuk (1984), P'ng (1987), Reinganum and Wilde (1986)] which examine the bargaining process explicitly explain failure to settle as arising from differences in information and endogenise the settlement rate and the settlement terms. The models differ in their assumptions about which party is better informed and whether the informed or uninformed makes the settlement offer. In Bebchuk (1984) the parties agree about the expected trial award and the plaintiff makes the settlement offer without knowing the probability the defendant attaches to winning the trial. The British rule is shown to lead to more trials than the American rule. In Reinganum and Wilde (1986) the parties have the same probabilty beliefs but only the plaintiff knows what damages will be awarded and he makes the settlement demand. The probabilty of settlement is not affected by the cost shifting rules. P'ng (1987) assumes that the award is common knowledge but only the defendant knows her level of care and she makes the offer. The British rule leads to more trials and to a larger offer but the effect on the number of accidents is ambiguous.

In this paper I use a model of legal disputes arising from accidents to examine the consequences of different cost shifting rules on the offers made by defendants, the settlement probability, the care of defendants and the accident probabilty and the ex ante and ex post expected utility of the parties. The bargaining model is simple in that the uninformed party makes the offer so that the complications which arise when offers from the informed party may convey information are avoided. It brings out in a transparent way the importance of the beliefs of the parties about the probability that the plaintiff will win his case and confirms Shavell's (1982) results in a model with endogenous settlement offer and probability of settlement. It also lends itself to explicit welfare comparisons which allow for the effect of the rules on pre and post-accident behaviour of the parties.

The model is set out in the next section and the effects of the rules are considered in section 3. Section 4 examines the welfare implications of cost shifting rules and draws some pessimistic conclusions about the usefullness of such rules as policy instruments.

2. THE MODEL

The sequence of events is as follows. The defendant choses her expenditure x on care. "Nature" has the next two moves, first determining whether there is an accident (probability $\pi(x)$, $\pi'(x) < 0$, $\pi''(x) > 0$) and then, if there is an accident, in picking the plaintiff's accident loss L according to some distribution function $Q(L)$. After an accident the defendant, who does not know the realised accident loss L but does know its distribution function, makes a settlement offer S to the plaintiff. The plaintiff decides to accept or reject the offer. If he rejects it the case proceeds to trial where he may win or lose. If the plaintiff wins the case he is awarded damages of L.

Trials and costs. The litigation costs of the plaintiff c_p and defendant c_d are incurred only if there is a trial[2] and may be shifted between them depending on the results of the trial.[3] The proportion of the plaintiff's litigation cost which is paid by the defendant if the plaintiff wins the case is k_p. k_d is the proportion of the defendant's litigation cost which is paid by the plaintiff if he loses the case.

This formulation is general enough to cover a number of possibilities of interest. With $k_p = k_d = 0$ we have the pure *American* rule that each party bears their own costs.[4] If $k_p > 0$, $k_d = 0$ the *Plaintiff favoured* rule operates and successful plaintiffs have part of their costs paid by the defendant. Unsuccessful plaintiffs bear their own costs but do not have to pay any of the defendant's costs. If $k_p = 0$, $k_d > 0$ we have the *Defendant favoured* rule. If $k_p = k_d = k > 0$ the *British* rule is in force and a proportion of the winner's costs are shifted to the loser.[5] We will investigate the effects of changing the cost shifting parameters k_p and k_d on the behaviour of parties. For example a switch from the American to the British rule is examined by setting $k_p = k_d = k$ and letting k increase from $k = 0$.

The plaintiff is not certain to win his case[6] and the plaintiff and defendant may attach different probabilities w_p, w_d to the plaintiff winning. When they disagree about the probability we will say that there is *relative optimism* if

$$w_p > w_d$$

relative pessimism if

$$w_p < w_d$$

and *conformity* if

$$w_p = w_d = w$$

As we will see, the probability beliefs have an important influence on the effects of different allocation rules.

Settlement offer and post-accident trial probabilty. After an accident the risk neutral plaintiff receives a settlement offer S from the defendant. He accepts the offer if it is as at least as great as his expected proceeds from a trial:

$$S \geq w_p L - (1 - w_p k_p) c_p - (1 - w_p) k_d c_d = w_p L - c_p + t_p \tag{1}$$

where $t_p = w_p k_p c_p - (1 - w_p) k_d c_d$ is the *plaintiff's expected cost transfer*: the amount which the plaintiff expects to be paid by the defendant as a result of the cost shifting rule.

If the plaintiff's loss is equal to or less than the *acceptance level* ℓ

$$\ell = \frac{[S + c_p - t_p]}{w_p} = \ell(S,k,c,w_p) \tag{2}$$

defined when (1) holds as an equality, he will accept the defendant's offer because, given his loss and thus his expected proceeds from a trial, he does at least as well accepting S as refusing it and proceeding to a trial.

The defendant does not observe L but does know that her offer S is accepted if $L \leq \ell(S,k,c,w_p)$, and that the probability of her offer being accepted is $Q(\ell(S,k,c,w_p))$. The defendant choses her settlement offer to minimise her expected post accident costs

$$H = Q(\ell)S + w_d\int_{\ell}^{L_1} LdQ + [1-Q(\ell)](c_d + t_d) = H(S,\ell(S,k,c,w_p),k,c,w_d) \tag{3}$$

where $t_d = w_d k_p c_p - (1-w_d)k_d c_d$ is the *defendant's expected cost transfer*: the payment she expects to make to the plaintiff under the cost shifting rules. If her offer is accepted (probability Q) her cost is just the settlement offer. If the offer is rejected and there is a trial she believes that there is probability w_d that the plaintiff will win his case and she will have to pay him expected damages of $\int_{\ell} LdQ$. The third term in (3) is the probabilty of a trial times the defendant's expected litigation costs.

I assume that the defendant's optimal offer:

$$S^* = S(k,c,w)$$

is positive and uniquely defined by the first order condition

$$\begin{aligned} H'(S,\ell,k,c,w_d) \equiv \frac{dH}{dS} &= H_S + H_\ell \ell_S = Q(\ell) + H_\ell \frac{1}{w_p} \\ &= Q(\ell) + q(\ell)\left[S - w_d\ell - c_d - t_d\right]\frac{1}{w_p} = 0 \end{aligned} \tag{4}$$

and the second order condition[7]

$$\begin{aligned} H''(S,\ell,k,c,w_d) \equiv \frac{d^2H}{dS^2} &= H'_S + H'_\ell \ell_S \\ &= q(\ell)\frac{1}{w_p} + \left[q(\ell)(w_p - w_d) + q'(\ell)(S - w_d\ell - c_d - t_d)\right]\frac{1}{w_p^2} > 0 \end{aligned} \tag{5}$$

The defendant's minimised post-accident expected cost is $H^*(k,c,w) = H(S^*,\ell,k,c,w_d)$ and her post-accident expected utility is utility is

$$V_{ad} = y_d - x - H^*(k,c,w) = V_{ad}(y_d,x,k,c,w) \tag{6}$$

where y_d is her endowed income and x her expenditure on care.

The plaintiff's post-accident expected utility, given his optimal accept-reject decision in the face of the defendant's optimal offer S^*, is

$$V_{ap} = y_p - EL + Q(\ell)S^* + w_p\int_{\ell}^{L_1} L dQ - [1-Q(\ell)](c_p-t_p) = V_{ap}(y_p,k,c,w) \tag{7}$$

where y_p is his endowed income and EL the expected accident damage.

Care and accident probability. Much of the literature on the cost rules has been concerned only with their post-accident effects. In many instances the parties can affect the probability of an accident by taking more or less care or deciding whether to engage in risky activities at all. Their decisions are influenced by the consequences for them of an accident and thus the rules can alter the number of accidents. A focus on post-accident effects on settlement rates or the expected post-accident utility of the parties is a potentially misleading guide to the welfare consequences of cost shifting rules.

In the current model only the defendant can influence the accident rate and she choses her care x to maximise her pre-accident expected utility

$$V_d = [1-\pi(x)](y_d-x) + V_{ad} = y_d - x - \pi(x)H^*(k,c,w) \tag{8}$$

Her optimal care $x(H^*)$ is assumed to be positive and satisfies[8]

$$-1 - \pi'(x)H^* = 0 \tag{9}$$

The marginal benefit from extra care is $-\pi'(x)H^*$, so that increases in the defendant's expected post-accident costs increase her incentive for care:

$$\frac{dx}{dH} = x'(H^*) = \frac{-\pi'(x)}{\pi''(x)H^*} > 0 \tag{10}$$

The defendant's level of care x and the parties' bargaining behaviour (S^* and ℓ) determine the ex ante, pre-accident expected utilities

$$V_{\mathrm{d}} = y_{\mathrm{d}} - x(H^*) - \pi(x(H^*))H^* = V_{\mathrm{d}}(k,c,w) \tag{11}$$

and

$$V_{\mathrm{p}} = [1-\pi(x(H^*))]y_{\mathrm{p}} + \pi(x(H^*))V_{\mathrm{ap}} = V_{\mathrm{p}}(k,c,w) \tag{12}$$

which form part of the welfare function in section 4.

3 COMPARISON OF COST SHIFTING RULES

The behaviour of the parties - the plaintiff's acceptance level, the defendant's offer and the defendant's care - and their pre and post accident expected utilities are influenced by the litigation costs they expect to incur if there is a trial. Accordingly changes in the cost allocation rules may change their behaviour and expected utility. As we will see the effects are often ambiguous and fail to lend strong support to those who favour one rule rather than another because of its supposed effect on behaviour or the utilities of the parties.

Acceptance level. Partially differentiating (2) with respect to the cost shifting parameters gives the marginal effect of the parameters on the plaintiff's willingness to accept a *given* offer from the defendant:

$$\frac{\partial \ell}{\partial k_p} = \ell_{kp} = -c_p \tag{13}$$

$$\frac{\partial \ell}{\partial k_d} = \ell_{kd} = c_d(1-w_p)/w_p \tag{14}$$

As might be expected increases in the amount he can recover from the defendant if he wins make him less willing to settle and increases in the amount he must pay the defendant if he loses make him more willing to settle.

The relationship between the four canononical allocation rules is illustrated in Figure 1. The rules are shown in the two parts of the figure by the points A (American rule), B (British rule), P (plaintiff favoured rule) and D (defendant favoured rule). The American rule has no cost shifting and A is at the origin where $k_p = k_d = 0$. The British rule has $k_p = k_d = k > 0$ and is represented by a point on the 45° line. The Plaintiff favoured rule is represented by a point on the vertical axis and the Defendant rule by a point on the horizontal axis. The straight lines through A and B with slope

$$\frac{dk_p}{dk_d} = \frac{-\ell_{kd}}{\ell_{kp}} = \frac{c_d(1-w_p)}{c_p w_p} \tag{15}$$

show combinations of the cost shifting parameters which yield a constant acceptance level ℓ and higher contours correspond to smaller ℓ and a greater reluctance to settle.

Denoting the acceptance levels for a given offer under the rules by ℓ^i $(i = A,B,D,P)$

we can summarise the effects the rules on the acceptance level in

PROPOSITION 1. For any given offer S:

$$(i) \quad \ell^{D} < \ell^{A} < \ell^{P}$$

$$(ii) \quad \ell^{D} \gtreqless \ell^{B} \Leftrightarrow k_{d} \gtreqless \kappa_{d} \equiv \frac{-kc_{tp}}{c_{d}(1-w_{p})}$$

$$(iii) \quad \ell^{P} \gtreqless \ell^{B} \Leftrightarrow k_{p} \gtreqless \kappa_{p} \equiv \frac{kc_{tp}}{c_{p}w_{p}}$$

$$(iv) \quad \ell^{A} \gtreqless \ell^{B} \Leftrightarrow t_{p} = k[c_{p}w_{p} - c_{d}(1-w_{p})] \gtreqless 0$$

Remarks. Any Defendant favoured rule has a greater acceptance level than the American rule, which in turn has a greater acceptance level than any plaintiff favoured rule because the plaintiff's expected trial costs are greatest under a Defendant favoured rule and smallest under a Plaintiff favoured rule.

Comparisons involving the British rule depend on the particular value of the cost shifting parameters, the parties' litigation costs and the probability that the plaintiff assigns to his winning at a trial. A switch from the British rule to the Plaintiff favoured rule will always make the plaintiff less willing to settle since his expected litigation costs are reduced unless k_p is also made smaller than κ_p. Similarly a switch from the British rule to the Defendant favoured rule will increase willingness to settle unless $k_d < \kappa_d$.

Under the British rule the plaintiff believes that the expected amount of costs transfered from him to the defendant after a trial is $t_p = kc_pw_p - kc_d(1-w_p)$. Thus if $\partial t_p/\partial k =$

$[c_p w_p - c_d(1-w_p)] > 0$ his expected litigation costs are smaller under the British rule than under the American rule and he is less willing to settle under the British rule. As (15) indicates this is equivalent to the contours of ℓ being flatter than the 45° line. The figure shows that it is more likely that the acceptance level is greater under the American than the British rule the flatter are the ℓ contours. Thus the American rule is more likely to lead to a larger acceptance level the smaller the plaintiff's costs relative to the defendant's and the smaller the probability the plaintiff attaches to his winning.

Settlement offer. The effect of changes in the litigation cost allocation rules on the probability of a trial cannot be predicted just by considering their effect on the plaintiff's willingness to accept a given offer because the offer will also be affected by the rules. Proposition 2 gives the relationship between defendant's offers S^i ($i = A,B,D,P$) under the four schemes.[9]

PROPOSITION 2. *(i)* $S^A < S^P$ *if there is relative pessimism;*

(ii) $S^A > S^D$ *if there is relative optimism;*

(iii) $S^A > S^B$ *if there is relative optimism (pessimism) and* $t_p < (>) 0$;

(iv) $S^A < S^B$ *if there is relative pessimism (optimism) and* $t_p > (<) 0$;

(v) If there is conformity then

(a) $S^A = S^P - k_p w c_p$

(b) $S^A = S^D + k_d(1-w)c_d$

(c) $S^A = S^B - t_p$

Remarks. The defendant choses her offer by equating the marginal cost of a greater offer with its marginal benefits. The marginal cost of a higer offer is the probability Q that it is accepted. The marginal benefit is the reduction in the probabilty of a trial since trials are more expensive for the defendant than settlement.

An increase in the cost shifting parameters k_i alters the transfer which the plaintiff expects to receive t_p and which the defendant expects to make t_d. The change in t_p alters the plaintiff's willingness to accept a given offer ℓ. Intuition suggests that if the plaintiff becomes more willing to settle the defendant will reduce her offer. Unfortunately intuition is misleading. Suppose for definiteness that ℓ is increased. Then the marginal cost Q of the defendant's offer is increased at the rate $q(\ell)$. But ℓ also affects the marginal benefit of the offer. Increases in ℓ reduce the gain from settling rather than going to trial since the expected award $w_d \int_\ell L dQ$ is reduced. Increases in ℓ also alter the rate $[-q(\ell)/w_p]$ at which the probability of a trial declines. Thus differentiating H' with respect to ℓ gives (see (4))

$$\frac{\partial H'}{\partial \ell} = H_{S\ell} + H_{\ell\ell}\ell_S = q(\ell) + \{q'(\ell)[S - w_d \ell - c_d - t_d] - q(\ell) w_d\}\frac{1}{w_p} \tag{16}$$

which is in general of ambigous sign.[10] Only by placing restrictions on the distribution of the plaintiff's loss and making assumptions about the parties' probability beliefs can (16) be signed. Suppose for example that the loss distribution is uniform $[q'(\ell) = 0]$. Then (16) is negative if there is *relative pessimism* ($w_d > w_p$) since increases in ℓ increase the marginal benefit from the offer at the rate $-qw_d/w_p$ which is greater than the rate at which the marginal cost of the offer q has increased. Thus in these circumstances an increase in the plaintiff's willingness to accept the defendant's offer tends to increase the offer.

Changes in the defendant's expected cost transfer t_d as a result of an increase in a cost shifting parameter have a more straightforward effect on her offer. If t_d is increased by the change in k_i the gain to settling rather than going to trial is increased and this tends to increase the defendant's offer.

The overall effect of the cost shifting parameters on the offer depends on the relative magnitudes of the effects of t_p and t_d on the marginal cost and marginal benefit of the defendant's offer. After some rearrangement and making use of the second order condition it is possible to decompose the change in the offer into two terms:

$$\frac{\partial S^*}{\partial k_i} = S^*_{ki} = -w_p \ell_{ki} + \frac{(w_p - w_d) q c_i}{w_p H''} = \frac{\partial t_p}{\partial k_i} + \frac{(w_p - w_d) q c_i}{w_p H''} \tag{17}$$

The first term $(\partial t_p/\partial k_i)$ is the change in the offer induced by the change in the plaintiff's expected trial costs. If t_p is reduced the defendant reduces her offer \$ for \$ and the settlement probability would be unchanged. However the defendant's exploitiation of the change in the plaintiff's position is also influenced by the fact that the relative costs of settlement and trial may have been altered. As we argued above if $w_p > w_d$ the marginal benefit of the defendant's offer is increased and this tends to increase her offer.

Probability of settlement. The cost allocation rules affect the plaintiff's acceptance level by making him more or less likely to accept a given offer and also by changing the offer he receives from the defendant: $\ell(S^*(k,c,w),k,c,w)$. Both effects are allowed for in[11]

$$\frac{dQ(\ell(S^*(k,c,w),k,c,w_p))}{dk_i} = q\ell_{ki} + q\ell_S S^*_{ki} = -\frac{(w_p - w_d)qc_i}{w_p^2 H''} \tag{18}$$

and the effect of the cost shifting parameters can be summarised in

PROPOSITION 3: Increases in the proportion of plaintiff or defendant costs which are shifted onto the loser of a trial increase, reduce or do not affect the settlement probability as there is relative pessimism, optimism or conformity of probability beliefs.

Remarks. An intuitive rationale for this result can be given in terms of the effect of the cost shifting rules on the incentive to settle rather than litigate provided by the parties' expected litigation costs. If there is a trial the sum of costs which the parties expect to bear is

$$c_p - t_p + c_d + t_d = c_p + c_d + (w_d - w_p)(k_p c_p + k_d c_d) \tag{19}$$

The total actual litigation cost of the parties is c_p+c_d which is obviously unaffected by the allocation cost rules which merely transfer the cost between the parties. However if the parties have different probability beliefs the total actual litigation cost will differ from the sum of the litigation costs which the parties expect to bear after cost shifting. With different probability beliefs the transfer the plaintiff expects to receive t_p is different from the transfer the defendant expects to make t_d and (19) differs from c_p+c_d.

Suppose for example that the proportion of plaintiff's costs shifted to the defendant if the plaintiff wins (k_p) increases. This makes the plaintiff less willing to accept a given offer. If the defendant attaches a greater probability to the plaintiff winning than the plaintiff she is lead to increase her offer by more than enough to offset the plaintiff's reduced willingness to settle. The net effect is to increase the probability of settlement. On the other hand if $w_d < w_p$ the defendant will not increase her offer by enough to offset the plaintiff's willingness to settle (and may even reduce S).

If their beliefs conform then $t_p = t_d$ and the total expected litigation costs are unaffected by the cost shifting rules. A change in the cost shifting parameters will lead to changes in the plaintiff's willingness to accept a given offer and to changes in the offer made but these changes will be completely offsetting if the parties agree on the probability of the plaintiff winning at a trial.

The implication of proposition 3 is that settlement probability is the same under all regimes unless the parties make different probabilty judgements but that if they make different judgements the ranking of the allocation rules is determined entirely by whether there is relative pessimism or relative optimism. For example if there is relative pessimism any increase in the cost shifting parameters increases the settlement probabilty so that the Plaintiff favoured and Defendant favoured rules will have larger settlement rates than the American rule and the British rule will have a higher settlement rate than any of the other three rules.

Post-accident expected utilities. Differentiating (7) with respect to k_i gives the effect of increases in the cost shifting parameters on the expected income of the plaintiff, given that there has been an accident:

$$\frac{dV_{ap}}{dk_i} = \frac{\partial V_{ap}}{\partial \ell}\ell_{ki} + \frac{\partial V_{ap}}{\partial S}S^*_{ki} + \frac{\partial V_{ap}}{\partial k_i} = \frac{\partial V_{ap}}{\partial S}S^*_{ki} + \frac{\partial V_{ap}}{\partial k_i}$$

$$\begin{aligned} &= QS_{kp} + (1-Q)w_{pc_p} > 0 \qquad && (i = p) \\ &= QS_{kd} - (1-Q)(1-w_d)c_d < 0 && (i = d) \end{aligned} \tag{20}$$

The marginal effect on the defendant's post-accident expected costs is:[12]

$$\begin{aligned} \frac{dH^*}{dk_i} &= \frac{dH}{dS}S^*_{ki} + \frac{\partial H}{\partial \ell}\ell_{ki} + \frac{\partial H}{\partial k_i} = \frac{\partial H}{\partial \ell}\ell_{ki} + \frac{\partial H}{\partial k_i} \\ &= c_p[Qw_p+(1-Q)w_d] > 0 \qquad && (i = p) \\ &= -\,c_d[Q(1-w_p)+(1-Q)(1-w_d)] < 0 && (i = d) \end{aligned} \tag{21}$$

Letting V^i_{ap} and H^i $(i = A,B,P,D)$ denote the plaintiff's expected post-accident utility and the defendant's post-accident expected cost under the rules, (21) and (20) imply

PROPOSITION 4. *(i)* $H^P > H^A > H^D$

(ii) $H^P > H^B > H^D$

(iii) $H^B > (<)\ H^A$ *if* t_p *and* $t_d > (<)\ 0$

(iv) $V^P_{ap} > (<)\ V^A_{ap}$ *and* $V^B_{ap} > (<)\ V^D_{ap}$ *if* $w_p \le (\ge)\ w_d$

(v) $V^B_{ap} > (<)\ V^A_{ap}$ *if* $t_d \ge (\le)\ t_p \ge (\le)\ 0$ *with one of these inequalities strict.*

Remarks. A change in the rules alters the anticipated cost transfers and thus the plaintiff's willingness to accept a given offer and the defendant's offer. Since the defendant's offer minimises her post-accident costs the marginal value of her offer in terms of reducing her post-accident costs is zero. Thus the effect on her expected post- accident costs of the change in her offer induced by the cost shifting rules can be ignored. H is however altered directly by the changes in the plaintiff's acceptance level and the cost transfer anticipated by the defendant. Since settlement is cheaper for the defendant than trial an increase in the acceptance level reduces H. The plaintiff's acceptance level ℓ is reduced if the cost transfer he anticipates increases. Thus if a change in the rules increases both t_p and t_d the defendant's expected post accident costs are increased and we have the first three parts of the proposition.

The plaintiff makes an optimal accept or reject decision and so the effect of the rules on him is via the change in the offer and the cost transfer t_p he anticipates, rather than through his optimal acceptance level ℓ. As we saw in proposition 2 the effect of the rules on the offer made is in general ambigous and so stronger assumptions have to be made to sign the effect on V_{ap}. Note that if there is conformity of probabilty beliefs the comparison of the Plaintiff and Defendant favoured rules with the American and British rules is unambigous and intuitive: increases in the proportion of the plaintiff's costs shifted to defendant make the plaintiff better off and reductions make him worse off. However comparison of the American against the British rule is not straightforward because the fact that the plaintiff is not certain to win his case means that cost shifting could increase or reduce the share of total litigation costs borne by him. For example, from Propostition 2(iv) a positive expected transfer t_p and relative pessimism ensure that he gets a larger offer under the British rule. Since the transfer is also greater he is better off under the British rule and we have part (iv) of Proposition 4.[13]

Accident probability. Since the defendant's post-accident costs provide her incentive to take care the first three parts of Proposition 4 can be used to compare the probability of an accident under the four regimes. There will be fewer accidents under the Plaintiff favoured rule and most under the Defendant favoured rule. The British rule will lead to fewer or more accidents than the American rule depending on whether *both* parties expect that it will transfer costs to or from the defendant.

Volume of litigation. The number of trials depends on the probability that a dispute is settled Q and on the number of accidents which give rise to damage claims. Changes in the rules alter the accident probability because they affect the defendant's expected costs H^* and this provides his incentive for care. Thus to evaluate the effect of cost allocation rules on the volume of litigation account must be taken of their effect on the settlement and accident probabilities:

$$\frac{dT}{dk_i} = \frac{d(1-Q)\pi}{dk_i} = -q\ell_{ki}\pi + (1-Q)\pi'(x)x'(H)\frac{dH^*}{dk_i} \tag{22}$$

Letting T^i ($i = A,B,D,P$) be the probability of trial under the four rules we have

PROPOSITION 5. *(i)* $T^A < {}^{td}$ *and* $T^B > T^P$ *if* $w_d \geq w_p$

(ii) $T^A > T^P$ *and* $T^B > T^D$ *if* $w_d \leq w_p$

(iii) $T^A > (<)\ T^B$ *if* $t_p \geq (\leq) \geq (\leq)\ t_d \geq (\leq)\ 0$ *with at least one of the inequalities strict.*

Remarks. In general the effect of the cost rules on the demand for trials is difficult to predict because the rules change both the settlement rate and the number of disputes in potentially offsetting ways. However in the circumstances specified in the proposition the effects are reinforcing and definite predictions can be made. Compare the American and British rules for example. We know from the analysis of the settlement rate that any increase in cost shifting increases the settlement rate if there is relative optimism. Proposition 4 indicates that the defendant's expected post-accident costs are greater (and thus the accident rate smaller) under the British rules if the anticipated cost transfers are positive. Thus a change from the American to the British rule reduces the number of trials since the settlement rate increases and the accident rate falls if $w_p > w_d$ and t_p, $t_d > 0$, which is equivalent to $t_p > t_d > 0$.

Pre-accident expected utilities. The effect of the cost shifting parameters on the defendant's pre-accident expected utility is straightforward:

$$\frac{dV_d}{dk_i} = \frac{dV_d}{dx}\frac{\partial x}{\partial k_i} + \pi\frac{dV_{ad}}{dS}\frac{\partial S}{\partial k_i} + \frac{\partial V_d}{\partial k_i} = -\pi\frac{\partial H^*(k,c,w)}{\partial k_i} \tag{23}$$

Since her offer and the amount of care she takes are chosen optimally the marginal value of changes in S and x caused by variations in the cost shifting parameters is zero. Only the direct effects of the parameters on the defendant matter and these are just the changes in her post-accident costs times the probabilty that there is an accident. Thus Proposition 4 tells us how the defendant would rank the alternative rules pre and post accident.

The plaintiff's pre-accident ranking of the rules may however differ from his post-accident ranking because the marginal value of changes in the defendant's behaviour (S and x) is not zero for him. Differentiation of (12) with respect to the cost shifting parameter k_i shows that the direction of the effects of the parameters on pre and post accident expected utility may differ since:

$$\frac{dV_p}{dk_i} = (V_{ap} - y_p)\pi' x' \frac{dH^*}{dk_i} + \pi \frac{dV_{ap}}{dk_i} \tag{24}$$

The overall effect of the parameters depends on the change in post-accident expected utility multiplied by the accident probability and on the change in the probability of an accident times the difference in expected utilty with and without an accident (V_{ap}-y_p). This is ambigous for two reasons. First, the direction of the change in H^* (and thus the change in the accident probability) does not restrict the direction of the change in V_{ap}. Second, V_{ap}-y_p could be positive or negative. As inspection of (7) reveals it is possible that the plaintiff could be over ($V_{ap} > y_p$) or under ($V_{ap} < y_p$) compensated for an accident depending on how large the defendant's offer is in relation to the expected loss and trial costs. Only in some special cases can we make any definite comparisons of the alternative rules. For example confining our attention to the plausible case in which the plaintiff is under-compensated and letting V_p^i ($i = A,B,D,P$) denote the plaintiff's pre-accident expected utility under the four rules we have

PROPOSITION 6. If there is under-compensation

(i) $V_p^A < V_p^P$ *and* $V_p^B > V_p^D$ *if there is relative pessimism*

(ii) $V_p^A > V_p^D$ *and* $V_p^B < V_p^P$ *if there is relative optimism*

(iii) $V_p^A < (>) V_p^B$ *if* $t_d \geq (\leq) t_p \geq (\leq) 0$ *and one of the inequalities is strict.*

Remarks. If there is under-compensation the plaintiff is better off if the probability of an accident decreases. Thus if a rule change also increases his post-accident expected utility and increases the defendant's expected post-accident costs (reducing the accident probability) he is definitely better off. For example if $t_d > t_p > 0$ the defendant has larger expected post-accident costs under the British rule than under the American rule [Proposition 4(iii)] and the defendant has a greater post-accident expected utility [Proposition 4(v)] and the plaintiff would prefer the British rule.

4. WELFARE AND COST SHIFTING RULES

Most analyses of cost shifting rules do not consider the welfare implications of the rules explicitly. Many concentrate on the post-accident implications of the rules for the settlement rate or the amount of the settlement. This is not a satisfactory basis for policy if the parties pre-accident behaviour influences the probability of an accident. For example plaintiffs may be better off after an accident under one rule rather than another but be exposed to a greater accident risk. It is necessary to evaluate policies from an ex ante pre-accident viewpoint and we will use the welfare function

$$
\begin{aligned}
W &= V_{\mathrm{p}} + V_{\mathrm{d}} + \pi(1-Q)(\sigma-c_{\mathrm{J}}) \\
&= y_{\mathrm{p}} + y_{\mathrm{d}} - x - \pi EL - T[c_{\mathrm{p}}+c_{\mathrm{d}}+c_{\mathrm{J}}-\sigma] + \pi(w_{\mathrm{p}}-w_{\mathrm{d}})\int_{\ell}^{\mathrm{L}_1}(L+k_{\mathrm{p}}c_{\mathrm{p}}+k_{\mathrm{d}}c_{\mathrm{d}})dQ
\end{aligned}
\tag{25}
$$

where c_{J} is the cost of a trial borne by taxpayers, σ is the social value of any precedents created by a trial and $T = \pi(1\text{-}Q)$ is the probability of a trial.

This welfare function is similar to that used in other models of accidents and litigation [Polinsky and Rubinfeld (1988)] in that it is concerned only with efficiency, is individualistic and non-paternal. We make the assumption that $1 has the same social value whether it accrues to plaintiffs, defendants or taxpayers so that issues of distribution are ignored. As in other models there are three types of cost to be taken into account: the defendant's cost of care, the accident cost imposed on the plaintiff and the net costs of a trial.

Non-paternalism takes a stronger form than usual in that the planner respects the probability beliefs of the parties as well as their preferences rather than imposing his own probability beliefs. This explains the presence of the final term in (25) which arises because the parties attach different probabilities to the plaintiff winning at the trial.

The marginal effect of the cost shifting parameter k_{i} on the welfare function is

$$
\begin{aligned}
\frac{dW}{dk_{\mathrm{i}}} &= \frac{dV_{\mathrm{p}}}{dk_{\mathrm{i}}} + \frac{dV_{\mathrm{d}}}{dk_{\mathrm{i}}} + (\sigma-c_{\mathrm{J}})\frac{dT}{dk_{\mathrm{i}}} \\
&= (V_{\mathrm{ap}}-y_{\mathrm{p}})\pi' x'\frac{dH^*}{dk_{\mathrm{i}}} + \pi\frac{dV_{\mathrm{ap}}}{dk_{\mathrm{i}}} - \pi\frac{dH^*}{dk_{\mathrm{i}}} \\
&\qquad + (\sigma-c_{\mathrm{J}})\left[q\ell_{\mathrm{ki}}\pi - (1-Q)\pi'(x)\,x'(H)\frac{dH^*}{dk_{\mathrm{i}}}\right]
\end{aligned}
\tag{26}
$$

It is apparent that it is in general impossible to say whether the overall effect is positive or negative and to determine which is the welfare maximising cost allocation rules. To determine which rule is best it is necessary to know whether the acceptance level, offer and care level are too large or too small and whether they are increased or decreased by the cost shifting parameters.

It is instructive to consider a simple special case in which there is uniformity of probability beliefs and the precedent value of a trial is smaller than the public sector costs ($c_J < \sigma$). The last term in the wefare function (25) is zero and the first best efficient allocation is characterised by no trials and a care level which minimises the sum of the cost of care and the expected accident cost:

$$Q(\ell) = 1 \tag{27}$$

$$-1 - \pi'(x^{**})EL = 0 \tag{28}$$

In these circumstances it is possible to draw some firm welfare conclusions:

PROPOSITION 7. *(i) If $w > q(L_1)(c_p+c_d)$ the first best is not achievable by any cost shifting rule.*

(ii) If there is undercompensation ($V_{ap} < y_p$) under the American rule then (a) the American rule is better than the Defendant favoured rule and worse than the Plaintiff favoured rule;

(b) the British rule is better than the American rule if the expected transfer to the plaintiff is positive.

(iii) it is possible to achieve the first best by charging each party a fee

(positive or negative) under all rules, provided that the British rule does not shift all of the post-fee litigation costs)

Remarks. When the parties have the same beliefs about the probability of the plaintiff winning the case, we know from Proposition 3 that the probability of settlement is the same under all cost shifting rules. The condition in part (i) of the Proposition ensures that the defendant's optimal offer is not certain to be accepted[14] and so there is a positive probability of a socially costly trial under all rules. Since the rules cannot affect the trial probabilty their welfare properties depend on their effects on the defendant's care level. In general the defendant's care is inefficient because she does not bear the social costs of accident:

$$y_p - V_{ap} + H + (1-Q)(c_J - \sigma) = EL - (1-\hat{Q})(c_p + c_d + c_J - \sigma) \tag{29}$$

but only her private accident costs H. Given our assumption that $c_J > \sigma$ her incentive to take care is too small if the plaintiff is undercompensated for the accident. If the American rule leads to undercompensation for the plaintiff then a change to a rule which increases the defendant's post-accident costs can increase welfare.

First best efficiency requires an efficient number of trials (zero in this simple example) and an efficient level of care. A general cost shifting scheme provides two policy instruments (k_p and k_d) to achieve the two efficiency targets. But when the parties have identical probability beliefs neither instrument is of any use in achieving the efficient number of trials. Cost allocation rules change behaviour by changing the costs borne by the parties but they are constrained by the fact that they merely transfer costs from one party to the other and do not affect the total costs of the two parties. In order to alter the probabilty of a trial it is necessary to alter their combined litigation costs by positive or negative fees or subsidies for a trial ie transfers between the litigants and a third party: the taxpayer.

Let $C_i = c_i + a_i$ $(i = p,d)$ denote the litigation costs after the fee for a trial is paid or the subsidy received and set the fees so that

$$1 - \frac{q(L_1)}{w}(C_p + C_d) \leq 0 \tag{30}$$

$$C_p - t_p = wL_1 - EL \tag{31}$$

The first of these implies that the defendant will make an optimal offer which is certain to be accepted by the plaintiff (so that $\ell = (S + C_p - t_p)/w = L_1$ and $Q = 1$). This optimal offer is $S = wL_1 + t_p - C_p$ and (31) ensures that it is equal to the expected accident loss suffered by the plaintiff ($S = EL$). Since the offer is always accepted, the defendant's post-accident cost is EL she is lead to take first best care and both (27) and (28) are satisfied.

The only circumstances in which it is not possible to adjust the a_i until (30) and (31) hold is when British cost shifting rule operates to shift all the post-fee litigation costs [$t_i = wC_p - (1-w)C_d$]. If this occurs the left hand side of (31) becomes $(C_p + C_d)(1-w)$ and it is not possible to find a pair of fees (a_p, a_d) such that (30) and (31) hold simultaneously. The pair of policy instruments is effectively reduced to a single instrument if all post-fee litigation costs are shifted.

Cost shifting rules do have welfare implications in that they change behaviour and the expected utilities of potential litigants but their usefullness as policy instruments seems limited. The optimal cost shifting rule is likely to vary depending on fine details of the objective circumstances of the parties (Q, π etc) and their subjective probability beliefs. It seems more promising to pursue other, more direct, means of correcting the inefficient incentives for care provided by a costly and imperfect legal system.

NOTES

1. In a sample of English personal injury cases the total cost per £1 of compensation paid to the plaintiff were £1.75 in the County Courts and £0.75 in the High Court (Civil Justice Review, 1986, 33).

2. For simplicity litigation costs at a trial are assumed to be exogenous. The effect of litigation cost allocation rules on litigation costs have been examined by several authors. Braeutigam, Owen and Panzar (1984) and Katz (1987) assume that parties never settle legal disputes. Hause (1989) does consider the effect of endogenous litigation costs on the difference between the plaintiff's minimum acceptable offer and the defendant's maximum offer. However there is no explanation of why the parties fail to agree if there are gains to settling rather than proceeding to trial and no consideration of the effects of the rules on bargaining behaviour of the parties.

3. Most specifications of the "loser pays" British rule do not take account of the fact that the under the rule actually used in England a defendant "loses" a case only if the court finds for the plaintiff *and* makes an award which is at least as great as the defendant's offer. This complication makes no difference if, as is assumed in this paper, the award the court will make if judgement is in his favour is known to plaintiff. Phillips, Hawkins and Flemming (1975), Miller (1986) and Gravelle (1989) have examined this version of the English rule.

4. The situation in America is more complicated than this simple formulation since in some types of case costs can be shifted [Miller (1986), Leubsdorf (1984)].

5. The proportion of costs shifted is often less than 100%. In England the winning party's costs are taxed and the loser typically pays about two thirds of the winner's costs.

6. Even under strict liability rules the plaintiff needs to establish that injury falls within the class carrying strict liability and that the defendant was responsible for the injury.

7. This requires that H be strictly convex in S which imposes restrictions on the cost shifting parameters, the probability beliefs, and the litigation costs as well as the distribution function Q. For example if the plaintiff's losses are uniformly distributed H is convex if and only if $w_p > w_d/2$.

8. Since $\pi(x)$ is convex in x this condition is also sufficient.

9. The proposition can be proved by integrating (17). Given the assumptions in the relevent parts of the proposition and the assumed convexity of H (17) will have the same sign for all values of the cost shifting parameters.

10. Appealing to the second order condition does not help since as inspection of (5) indicates $H_\ell' > 0$ is not necessary for $H'' > 0$. Nor is the fact that the first order condition

implies that the square bracketed part of the second term is negative of any help in signing (16).

11. Substitute for $\partial S^{*}/\partial k_{i}$ from (17).

12. Use the first order condition on S to substitute $-H_{S}/\ell_{S} = -Qw_{p}$ for H_{ℓ} and use (13) and (14).

13. $t_{p} > 0$ and $w_{p} < w_{d}$ imply that $t_{d} > t_{p} > 0$.

14. When there is conformity of beliefs $dH/dS = Q(\ell) - q(\ell)(c_{p}+c_{d})/w_{p}$ and if this is positive when $\ell = L_{1}$ the optimal S must be such that $Q < 1$.

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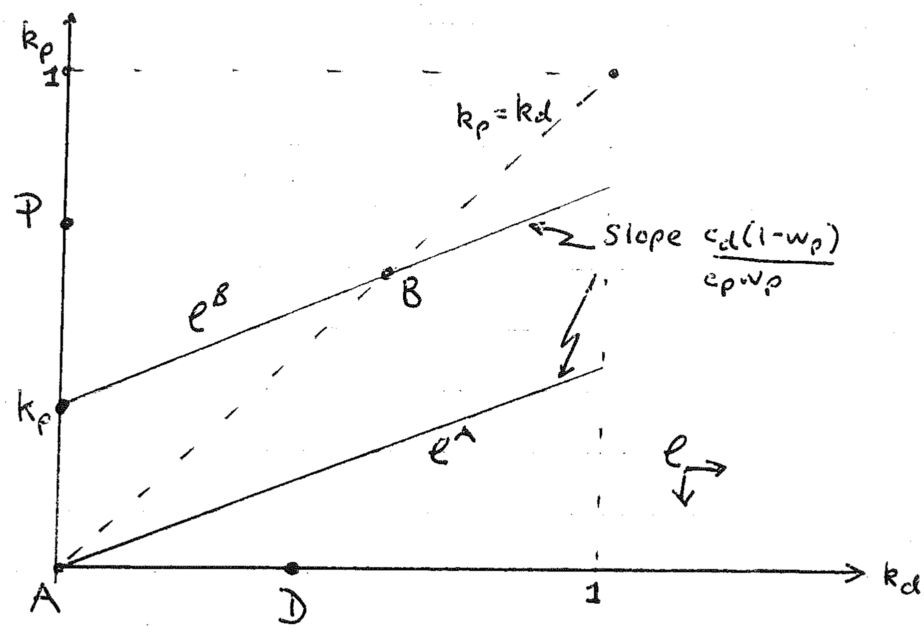
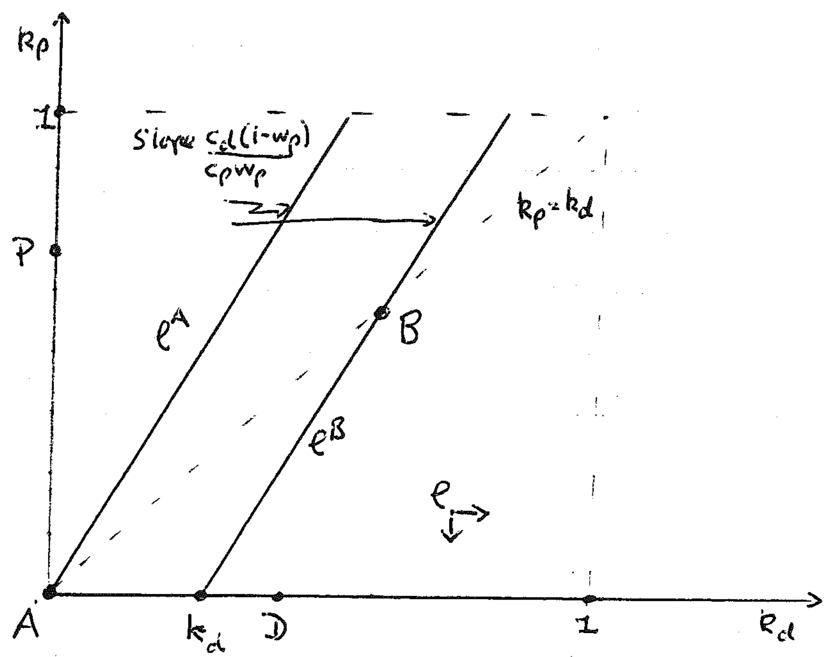


k_p
1
$k_p = k_d$
P
Slope $\frac{c_d(1-w_p)}{c_p w_p}$
e^B
B
k_f
e^A
e
A
D
1
k_d

1a



k_p
1
Slope $\frac{c_d(1-w_p)}{c_p w_p}$
$k_p = k_d$
P
B
e^A
e^B
e
A
k_d
D
1
k_d

1b