On Avoidance Activities After Accidents

Tim Friehe *
Eberhard Karls University, Tübingen

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Abstract

This paper introduces avoidance activities into the accident setting. We discuss implications for the distinction between strict liability and negligence, the desirability of different negligence conceptions, and the optimality of care standards. Importantly, our analysis shows that punitive damages, i.e., damages above harm, can be welfare-reducing if injurers can choose avoidance, and that uncertainty concerning the due care standard can be welfare-improving.

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*Address correspondence to: Eberhard Karls University, Department of Economics, Melanchthonstr. 30, 72074 Tübingen, Germany. Email: **tim.friehe@uni-tuebingen.de** Phone: 0049-7071-29-78213. Fax: 0049-7071-29-5590.
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1 Introduction

Individuals go to extreme lengths to avoid losses in well-being. Legal enforcement often entails such losses in the form of payment requirements, for instance. Consequently, individuals may invest considerable resources to avoid that enforcement. The associated total avoidance cost indeed are of a substantial magnitude (Sanchrico 2005). Accounting for this reality can have a drastic impact on policy recommendations. Malik (1990) allowed criminal offenders to undertake avoidance activities and established that, as a consequence, the high fine and low probability prescription of Becker (1968) no longer holds generally. The rationale for this finding resides in the positive marginal costs of fines given the possibility of avoidance.

This paper introduces avoidance activities into the realm of tort law. Legal advice demanded after the occurrence of an accident is a vivid example of such avoidance activity.[1] In the literature on the economic analysis of accident law, it has been realized that injurers sometimes escape being required to compensate the victim. However, it has not been analyzed that the injurer can undertake activities that have an effect on this probability of escape. We intend to begin to fill this void and arrive at strong conclusions on different matters central to the traditional analysis.

First and foremost, our analysis casts doubt on the rationale of the multiplier principle associated with punitive damages.[2] Although it is true that care increases with the payment of the injurer in the case of trial, so do avoidance activities. Since avoidance activities just as well use resources, they need to be reflected equally in social costs. We can establish the quite drastic result that it may be cost-efficient to leave the payment of the defendant below the level of harm. The rationale resides in the fact that the increase in care, which is desired from a social standpoint per se, may not be worth the induced increase in avoidance costs. Hylton and Miceli (2005) provide a related result. In that paper, it is shown that the traditional multiplier principle may be flawed if the effect of damages on the volume of suits is taken into account. We abstract from litigation costs but focus on costs due to behavioral adaptations.

Second, this paper shows that uncertainty concerning the due care standard may be welfare-

[1] Young et al. (2006) consider different defences in negligence, namely, absence of breach, absence of causation, and absence of foreseeability. They convincingly argue that injurers will take the least-cost avenue to avoid a negligence finding. Realistically, the establishment of any of these absences can at least partly be interpreted as avoidance.

[2] On the importance of this principle, Hylton and Miceli (2005) note that "The notion that damages should be multiplied by the reciprocal of the probability of punishment is one of the basic lessons of the law and economics literature."

improving in a setting with avoidance activities. The intuition behind this result is straightforward. The uncertainty may increase care towards the social optimum and decrease avoidance activities. This contrasts with the usual assessment that injurers being uncertain regarding the care standard worsens the outcome under negligence (Craswell and Calfee 1986).

In another direction of inquiry, we consider the effects of strict liability and negligence and find that negligence may turn out to impact individuals as strict liability de facto, i.e., that the distinction vanishes. This implies, in particular, that a positive level of avoidance and suboptimal care is taken in such cases. In turn, we supply second-best considerations on the negligence case, comprising different conceptions of negligence and a discussion on the optimal standard of care.

Relating our analysis to the literature, we have to accentuate that avoidance activities are rarely considered. The contribution of Malik (1990), referred to above, is a landmark in this regard. Innes (2001) shows that self-reporting, i.e., offering individuals who self-report their offense a sanction lower than usual, can be optimal because it prevents the occurrence of expenditures on avoidance. Recently, Sanchirico (2006) assesses the predominant ignorance with respect to detection avoidance. He likewise stays within the boundaries of criminal law, analyzes the recursiveness of avoidance, and recommends measures to decrease the effectiveness of avoidance. Although we treat effectiveness as exogenous, it will be of import in our study as well.

The rest of the paper is structured as follows. We present the model in Section 2. Next, we start to analyze the framework from the different perspectives alluded to above. Section 4 offers concluding remarks.

2 The Model

We consider a risk-neutral injurer who engages in an activity that may cause harm h to another individual. Injurer and victim are unacquainted with no chance to bargain at reasonable cost. The injurer can take care x to affect the probability of an accident $p(x)$, $0 < p(x) < 1$, with $p_x(x) < 0 < p_{xx}(x)$ and $x \geq 0$.[3] To facilitate internalization, a liability rule is put in place. We abstract from litigation costs. The injurer can undertake avoidance activities a given the occurrence of an accident to affect the probability of the compensation requirement

[3]Subscripts denote derivatives.

$\pi(a,e)$, $0 \leq \pi(a,e) \leq 1$, where $\pi_a(a,e) < 0 < \pi_{aa}(a,e)$ and $a \geq 0$. The probability of the injurer's compensation requirement is also a function of the effectiveness of avoidance activities e, $e \in (e_l, e_h)$, where $\pi_e(a,e)$, $\pi_{ae}(a,e) > 0$. Thus, higher e stand for lower avoidance effectiveness, which shows in the absolute level of $\pi(a,e)$ as well as at the margin $\pi_a(a,e)$. It is easily imagined that there is some scope for avoidance in many accident contexts, but not so in others. This effectiveness can therefore be imagined as factors that may be harnessed, e.g., a given uncertainty over causation or foreseeability. To simplify our analysis, we make the following assumptions

Assumption 1: $\lim_{a\to 0}\pi_a(a,e) = -\infty$

Assumption 2: $\lim_{x\to 0}p_x(x) = -\infty$

Assumption 3: $\lim_{e\to e_l}\pi(a,e) = 0\ \forall a$

Assumption 4: $\lim_{e\to e_h}\pi(a,e) = 1\ \forall a$

As usual, we assume that welfare maximization can be approximated by wealth maximization. Given constant activity, the social objective is the minimization of total social costs SC, being the sum of precaution costs, expected harm, and avoidance costs.

$$SC = x + p(x)(h + a) \tag{1}$$

In the social optimum, avoidance is nil since it is pure waste and optimal care x^* accords with

$$1 + p_x(x^*)h = 0. \tag{2}$$

The optimal care levels changes with harm according to

$$x_h^* = \frac{-p_x(x^*)}{p_{xx}(x^*)h} > 0. \tag{3}$$

3 The Analysis

3.1 Strict Liability versus Negligence

Under strict liability, injurers are always required to compensate victim harm. Consequently, injurers minimize injurer costs C, which can be stated as

$$C = x + p(x)[a + \pi(a,e)h] \tag{4}$$

The following first-order conditions describe the private optimum

$$1 + p_x(\hat{x})[\hat{a} + \pi(\hat{a}, e)h] = 0 \tag{5}$$

$$1 + \pi_a(\hat{a}, e)h = 0 \tag{6}$$

The comparative statics for the individually optimal injurer choice yield $\hat{x}_h, \hat{a}_h, \hat{x}_e > 0$ and $\hat{a}_e < 0$. These signs give support to the proposition of Sanchirico (2006), that it is sensible to change procedural rules and the like to reduce the effectiveness of avoidance. Care increases with a decrease in the effectiveness of avoidance, an increase in e, which is always desirable as long as $x < x^*$, and avoidance activities, which are waste itself and deteriorate enforcement, decline with a decrease in effectiveness.

The optimal value function for injurer costs for a given harm level and avoidance effectiveness is thus

$$C^A(e, h) = \hat{x} + p(\hat{x})[\hat{a} + \pi(\hat{a}, e)h] \tag{7}$$

Due to Assumption 1, we know that at least some effort is taken concerning the aversion of detection, $\hat{a} > 0$. This leads to our first observation.

Proposition 1 *Given Assumption 1, it holds that $\hat{a} > 0$ and $\hat{x} < x^*$ under strict liability.*

Proof. Assumption 1 ensures $\hat{a} > 0$. Then, $[\hat{a} + \pi(\hat{a}, e)h] < h$ follows. Since $\hat{x}_D > 0$ with $D = \hat{a} + \pi(\hat{a}, e)h$, $\hat{x} < x^*$ obtains. ■

Negligence, as the other principal liability rule, may release the injurer from liability but requires the taking of some standard of care, usually set equal to socially optimal care. Consequently, injurer costs in this case are given as

$$C = \begin{cases} x + p(x)[a + \pi(a, e)h] & \text{if } x < x^* \\ x + p(x)a & \text{if } x \geq x^* \end{cases} \tag{8}$$

Obviously, if the injurer takes due care, there is no longer a rationale to engage in avoidance activities so that $a = 0$ is individually optimal given $x \geq x^*$. Likewise, it is never optimal to choose more than due care. However, in contrast to the standard framework, there are always instances in which injurers choose to be negligent.

Proposition 2 *Given Assumption 3 and 4, and due care set equal to first-best care, injurers do not abide by the care standard under negligence if avoidance is highly effective, i.e., if $e < \bar{e}$, where $\bar{e}$ is the effectiveness for which $x^* = C^A(\bar{e}, h)$ holds.*

Proof. The cost of adhering to due care are $C^O = x^*$, which do not change with the effectiveness of avoidance. If care falls below due care, total injurer costs are given by (7). These increase with a decrease in effectiveness by $p(\hat{x})\pi_e(\hat{a}, e)h$. Assumption 3 and 4 ensure that there is a level of effectiveness $\bar{e}$. Thus, $C^A(e, h) < x^* \ \forall e < \bar{e}$. ■

The above details that the distinction between strict liability and negligence vanishes as far as the behavioral impact is concerned if the standard of care is perceived as excessive by injurers, given the opportunity and effectiveness of avoidance. A parallel can be found in the standard framework if the due care standard is set excessively high. However, for medium and low effectiveness of avoidance, we obtain a clear ranking of liability rules according to their effects on social costs.

Corollary 1 *Given Assumption 3 and 4, and due care set equal to first-best care, negligence implies lower social costs than strict liability for $e \geq \bar{e}$.*

Proof. By definition of $\bar{e}$, the injurer chooses x^* for $e \geq \bar{e}$ under negligence. In contrast, injurers choose $\hat{x} < x^*$ and $\hat{a} > 0 \ \forall e \in (e_l, e_h)$ with obvious implications for social costs. ■

3.2 Uncertain Due Care Standard

The standard framework may be attacked due to the assumptions on information available to individuals and/ or courts. Negligence ensures efficient care if due care equals efficient care in the standard model. For this to work, the injurer must have perfect information on the standard of care and the court must be in the position to accurately assess care taken. Weakening these presumptions questions the efficient outcome under negligence in the standard model. We present the consequences of weakening these presumptions for our model and find that uncertainty may improve upon the outcome achieved under perfect information.[4]

For this section, assume that injurers are uncertain as to which level of care is proclaimed as standard of care. Due care $x^s = x^* + \epsilon$ is a random variable due to ϵ being random on support $[-\Delta, \Delta]$ with f as density function of ϵ. We assume that the expected value of ϵ is equal to zero and that Δ is large enough so that taking care $x^* + \Delta$ is always dominated by some lower care level (so that uncertainty keeps its bite).[5] The injurer will be judged negligent

[4]Uncertainty on the due care standard and imperfect information of the court on the care taken are very similar in structure. Thus, our analysis would apply analogously if we were to assume that courts observe care only with error but injurers are certain on due care.

[5]This in turn will usually imply that $\hat{x} \in [x^* - \Delta, x^* + \Delta]$.

if care taken falls below due care. Consequently, being judged negligent has a probability of $F(x^* - x)$, where F is the distribution of ϵ, and the injurer cost function can be stated as

$$C^U = x + p(x)[a + F(x^* - x)\pi(a, e)h] \tag{9}$$

Note that we assume that avoidance is chosen before the uncertainty on due care is resolved. The following first-order conditions describe the private optimum and give a clear indication of the changes to the standard case.

$$1 + p_x(\tilde{x})[\tilde{a} + \pi(\tilde{a}, e)F(x^* - \tilde{x})h] - p(\tilde{x})\pi(\tilde{a}, e)f(x^* - \tilde{x})h = 0 \tag{10}$$

$$1 + \pi_a(\tilde{a}, e)F(x^* - \tilde{x})h = 0 \tag{11}$$

Concerning the incentives for care, there are two aspects that enter the analysis due to uncertainty on the due care level. First of all, there is a discount effect since harm is not borne by the injurer if the care taken is judged to be sufficient, i.e., because only $F(x^* - x)h$ is relevant instead of h itself. Counteracting the first effect on marginal care incentives, there is a liability prevention effect because an additional unit of care makes it less likely that a negligence finding will occur. Without further assumptions, it is not clear whether the resulting optimal care will be less than or greater than $\hat{x}$. Still, the literature takes the conclusion that this uncertainty increases care, i.e., that the second effect is stronger than the first, as fairly general (Shavell 2004, 227). It however is unambiguous that the incentives for avoidance are diminished since $F(x^* - \tilde{x}) < 1$ holds. This follows since there is no liability prevention effect with respect to avoidance, whereas the discount due to $F < 1$ works in full force.

Proposition 3 *Suppose that $e < \bar{e}$ and expected due care equal to first-best care. Then, social costs may be lower if injurers are uncertain regarding the due care level than if they are certain.*

Proof. Given that $e < \bar{e}$, injurers under negligence with certainty on due care do not comply with due care but choose $\hat{x} < x^*$ and $\hat{a} > 0$. As said, avoidance will fall due to uncertainty, i.e., $\tilde{a} < \hat{a}$ which lowers social costs from a standalone perspective. However, care incentives also change. Craswell and Calfee (1986) show that injurers may take more or less than due care depending on assumptions on the error term and its distribution in the model without avoidance. Similar considerations determine whether $\tilde{x}$ is less or greater than $\hat{x}$.

Consequently, if care incentives are not reduced and as long as care incentives are not boosted too much by the effect that liability can be prevented by a little more care, social costs will be lower in the setting with uncertainty.

A sufficient formal condition for this improvement can be stated as a condition on the marginal benefit from additional care. It has to hold that

$$-p_x(x^*)[\tilde{a} + \pi(\tilde{a}, e)F(0)h] + p(x^*)\pi(\tilde{a}, e)f(0)h \leq -p_x(x^*)h \tag{12}$$

$$-p_x(\hat{x})[\tilde{a} + \pi(\tilde{a}, e)F(x^* - \hat{x})h] + p(\hat{x})\pi(\tilde{a}, e)f(x^* - \hat{x})h \geq -p_x(\hat{x})[\hat{a} + \pi(\hat{a}, e)F(x^* - \hat{x})h] \tag{13}$$

since in that case, $\hat{x} \leq \tilde{x} \leq x^*$. ■

3.3 Second-Best Considerations on Negligence

In circumstances of high avoidance effectiveness, injurers deviate from the socially desired outcome by exerting suboptimal care and positive avoidance effort. In acknowledgment of this fact, policy makers may think about changing the setting in some way to obtain a second-best outcome. Interestingly, in the light of the results from the previous section, it may be optimal for the policy maker to introduce uncertainty on the care standard. We focus in the following on the possibility of adapting the care standard in some fashion. Our considerations are in the spirit of Gomez and Ganuza (2005), who consider second-best care standards in the context of judgment proofness.

From Proposition 2, we know that the injurer chooses x^* ($\hat{x}$) as long as $x^* \leq (>) C^A(e, h)$. Assume that the effectiveness of avoidance is some $e < \bar{e}$ so that the injurer does not take due care. The resources spend on avoidance have no social value. Consequently, $C^A(e, h)$ contains positive components without any value to the social problem. It is then possible to transform the outcome into something more desirable from a societal perspective. Let $x^{**}(e, h)$ be care such that $x^{**}(e, h) = C^A(e, h)$.

Proposition 4 *The optimal second-best negligence rule chooses* $\bar{x}(e, h) = min\{x^*, x^{**}(e, h)\}$ *as due care standard.*

Proof. Social costs under the standard negligence rule and the second-best rule are the same for $e \geq \bar{e}$. However, for $e < \bar{e}$, applying solely x^* implies social costs of $\hat{x} + p(\hat{x})[\hat{a} + h]$, whereas the use of $\bar{x}$ implies $x^{**} + p(x^{**})h$. It holds that $\hat{x} < x^{**}$ by definition of x^{**} for given e. An

increase in care is definitely desirable since $\hat{x}, x^{**} < x^*$. In addition, social costs fall due to the fact that no resources are spent on avoidance. ■

The modified negligence rule asserts that injurers have alternative means to attain their end of minimized individual costs. In cases of medium and low effectiveness, the first-best due care standard is an offer which is sufficiently attractive to individuals. However, for high effectiveness, combining care with avoidance is more attractive than taking first-best care. The second-best rule acknowledges this fact and elicits as much care from injurers as possible, while achieving the socially desired level of avoidance.

After discussing adjustments to due care, we turn our attention to another second-best consideration which concerns the interpretation of causation. Whereas it is usually assumed that injurers need to compensate victims fully if they breach their duty of care, another view argues that only the share of harm caused by the deviation from due care ought to be compensated. Both interpretations induce the same outcome in the standard model of tort law without imperfections. However, Kahan (1989) covers the reduced-compensation interpretation and shows its advantage over the usual conception if due care is chosen excessively, for instance.[6]

The reduced-compensation interpretation gives the following injurer cost function

$$C = \begin{cases} x + p(x)[a + \pi(a,e)\{h - \frac{p(x^*)}{p(x)}h\}] & \text{if } x < x^* \\ x + p(x)a & \text{if } x \geq x^* \end{cases} \tag{14}$$

Note that subject to $x < x^*$, the first-order conditions change to

$$1 + p_x(x^K)[a^K + \pi(a^K, e)h] = 0 \tag{15}$$

$$1 + \pi_a(a^K, e)\{h - p(x^*)/p(x^K)h\} = 0. \tag{16}$$

Given these alternative interpretations, we first inquire whether efficient care can be induced more often under either of the two.

Proposition 5 *Assume due care is set equal to first-best care. Injurers abide by the standard under the reduced-compensation interpretation for fewer levels of effectiveness than under the full-compensation interpretation of negligence.*

Proof. Again, the cost of adhering to due care is $C^O = x^*$, which do not change with the effectiveness of avoidance and are the same across both interpretations. As defined earlier, it

[6]We label one of the interpretations reduced-compensation only to have a shorthand and not to imply any judgment on when the victim is made full.

holds that $x^* = \hat{x} + p(\hat{x})[\hat{a} + \pi(\hat{a}, \bar{e})h] = C^A(\bar{e}, h)$. Now, the injurer reduces her costs given the different objective function under reduced-compensation by choosing (a^K, x^K) instead of $(\hat{a}, \hat{x})$. However, even if the injurer were to choose the latter activity vector, it holds that $\hat{x} + p(\hat{x})[\hat{a} + \pi(\hat{a}, \bar{e})h] > \hat{x} + p(\hat{x})[\hat{a} + \pi(\hat{a}, \bar{e})h] - p(x^*)\pi(\hat{a}, \bar{e})h$. Consequently, for the strategy of choosing due care to become profitable under the reduced-compensation interpretation, effectiveness has to fall further. ■

Next, we want to establish the relative magnitude of avoidance and care given that the standard of care is not chosen under both interpretations.

Proposition 6 *Given an effectiveness of avoidance for which less than due care is advantageous given the full-compensation and reduced-compensation interpretation, it holds that* $a^K < \hat{a}$ *and* $x^K > \hat{x}$.

Proof. Comparison of (6) and (16) shows that the reduced-compensation interpretation provokes less avoidance. Given this, evaluating (5) and (15) yields the result on care. ■

The last two results conflict with respect to the evaluation of the interpretations of causation from a social cost perspective. Whereas the reduced-compensation interpretation more often invokes injurers trying to avoid enforcement, the activity choices are more favorable than those under the full-compensation interpretation as soon as the latter also induces avoidance.

Before we conclude this subsection, we can combine the two different second-best considerations. Given that it is possible to adjust the negligence rule as detailed earlier, is it desirable for the negligence rule to be of the full-compensation or reduced-compensation interpretation initially?

Proposition 7 *The second-best negligence rule attains weakly higher care if negligence follows the full-compensation interpretation.*

Proof. We consider the respective performance for all $e \in (e_l, e_h)$. First, injurers adhere to x^* for more levels of e under full-compensation negligence. Next, for levels of effectiveness $e < \bar{e}$, care is always at least weakly higher under full-compensation since the second-best standard amounts to the level of individual costs and the level of total injurer costs under the reduced-compensation interpretation is always at least weakly below the level of the full-compensation interpretation. ■

Consequently, the ambiguous ranking of the different interpretations elaborated on above is no longer present as soon as we allow for a second-best adjustment to due care. Given that is possible, social costs are lower under the full-compensation interpretation.

3.4 Avoidance and Punitive Damages

Punitive damages are damages that exceed the harm to the victim. These are of importance especially in the United States, where punitive damages are awarded in roughly six percent of all cases in which plaintiffs prevail (Polinsky and Shavell 2000). Since incentives for care are optimal if damages equal harm in the standard framework, some additional factor needs to be accounted for to give punitive damages an economic rationale. An important justification resides in the possibility of injurers escaping from suit. For instance, Polinsky and Shavell (1998) argue that this possibility may be due to the fact that (i) it may be difficult for the victim to determine that the harm was the result of some partys act, (ii) it might be difficult for the victim to prove who caused the harm, and (iii) the victim might not sue because of expected litigation costs. Note that the extent to which causal factors (i) and (ii) affect the probability of escaping suit can, at least to some extent, be influenced by the injurer. We may thus reasonably argue that injurer avoidance activities can aggravate these factors.

Polinsky and Shavell (1998) continue by arguing that there is an optimal damage multiplier, being the reciprocal of the probability of liability. This is the usual recommendation of the literature; increase the damage payment to such an extent that care incentives are such that first-best care is induced.[7] We will evaluate this approach in the light of injurer's option to choose avoidance activities.[8]

Assume strict liability. The objective function of the injurer with damages d, where d might be greater than h, reads

$$C^{PD} = x + p(x)[a + \pi(a, e)d] \tag{17}$$

and gives the following first-order conditions

$$1 + p_x(x^{PD})[a^{PD} + \pi(a^{PD}, e)d] = 0 \tag{18}$$

[7]Craswell (1999) presents an evaluation and considers alternative opportunities to restore care incentives.

[8]The traditional wisdom is succinctly stated by Rubin (2005, 227): "Firms will sometimes make efforts to hide their wrongful behavior. If they succeed, then there is insufficient deterrence. Therefore, multiplied damages can be useful in preventing such efforts at concealment. The optimal damage multiplier should be the inverse of the probability of detection."

$$1 + \pi_a(a^{PD}, e)d = 0 \tag{19}$$

Lemma 1 *The first-best care level results if damages equal* $d^*(h,e) = \frac{h-a^{PD}}{\pi(a^{PD},e)} > h$.

Proof. Optimality condition (18) yields x^* if $a^{PD} + \pi(a^{PD}, e)d = h$ from which $d^*(h,e)$ follows. It holds that $d^*(h,e) > h$ since this inequality can be rearranged to $h > a^{PD} + \pi(a^{PD}, e)h$, which holds due to Assumption 1. ■

In the presence of avoidance activities, social costs are the sum of precaution costs, costs of avoidance, and expected harm. This is a factor that may argue against the optimality of the use of $d^*(h,e)$ as damage measure, since injurers would expend $p(x^*)a^{PD}(d^*, e)$ on avoidance if $d^*(h,e)$ were chosen. One may therefore expect that the optimal damage level may be lower than $d^*(h,e)$ to reflect the latter fact, on the one hand, but still surpass h to instill 'sufficient' care, on the other hand. We find that optimality considerations may restrict the damage measure even further.

Proposition 8 *The optimal level of damages is generally different from* $d^*(h,e)$ *and may even fall short of harm.*

Proof. The policy maker solves the following constraint minimization problem to find the optimal level of damages.

$$\min_{x,\, a,\, d} x + p(x)[a + h] \tag{20}$$

subject to

$$x = \text{argmin}_x\{x + p(x)[a + \pi(a, e)d]\} \tag{21}$$

$$a = \text{argmin}_a\{a + \pi(a, e)d\} \tag{22}$$

Setting up the Langrangean with λ_i, $i = 1, 2$, as multipliers, the set of conditions describing the optimum is

$$1 + p_x[a + h] + \lambda_1 p_{xx}[a + \pi d] = 0 \tag{23}$$

$$p + \lambda_2 \pi_{aa} d = 0 \tag{24}$$

$$\lambda_1 p_x \pi + \lambda_2 \pi_a = 0 \tag{25}$$

From this, we can derive an expression which implicitly defines the optimal level of damages

$$d^{opt} = \frac{p\pi_a p_{xx}[a + \pi d^{opt}]}{\pi_{aa} p_x \pi[-1 - p_x[a + h]]} \tag{26}$$

There is no reason to assume that the level of damages defined by (26) equals d^*. Note for instance, that, whereas d^{opt} is a function - inter alia - of the productivity of injurer care with respect to the accident probability, d^* is totally unaffected by changes in the care effectiveness.

To prove the possibility that d^{opt} may fall short of the magnitude of harm and show the dependence of d^{opt} on the effectiveness, we rely on an example. Assume $p(x) = \frac{1}{1+x}$, whereas $\pi(a, e) = \frac{10-(a/f)\cdot 9}{10}$. Note that this function $\pi(a, e)$ complies with $\pi_a < 0$ and $\pi_e, \pi_{aa}, \pi_{ae} > 0$. Harm amounts to 200. Optimal damages as a function of effectiveness e are depicted in Figure 1.

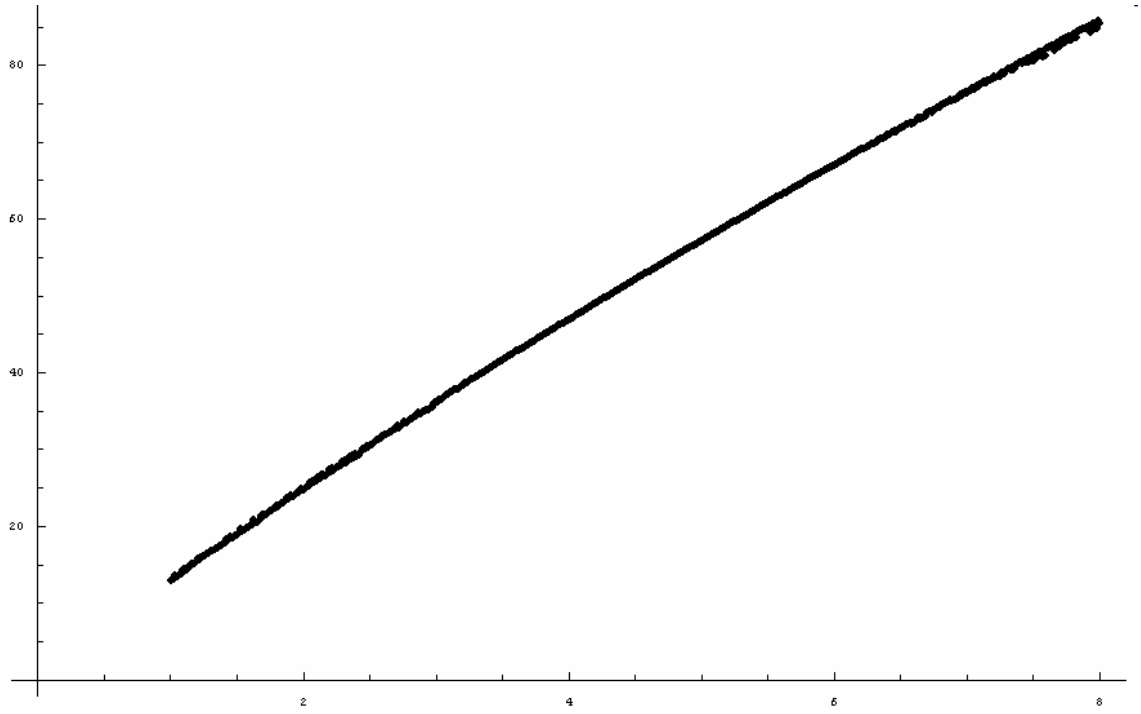

Figure 1: Damages d as a function of e

In our example, damages are far below harm if avoidance is very effective. A decrease in the effectiveness decreases the attractiveness of avoidance as a method to minimize the expected payment. Consequently, the level of damages can increase. This combines with the decrease in avoidance effectiveness in inducing higher care. ■

We find that punitive damages might indeed turn out as counterproductive concerning the

minimization of total social costs. In analogy to the finding of Malik (1990), an increase in the payment due upon detection increases the efforts to avoid detection. The optimal level of damages needs to balance the desire to increase care incentives and lower avoidance activities.

4 Conclusion

Avoidance activities are an important avenue for the minimization of individual costs. This has been recognized within the literature on criminal law. However, it is of import in the accident setting as well. There are various means that injurers can utilize to decrease the probability that a legally binding request for compensation comes into effect.

Admitting the possibility of avoidance introduces complications into the standard model of accidents. We established that the distinction between strict liability and negligence in effect vanishes for highly effective avoidance opportunities. In view of this fact, it may be best to use the negligence rule, however, only after adjusting due care to a second-best level. Enriching the model by avoidance importantly casts doubt on the optimality of punitive damages. Since avoidance activities are socially costly and increase with the payment requested from the injurer, avoidance presents a nonnegligible counterargument to the traditional multiplier principle. We also established that uncertainty on due care can be welfare-improving in a setting which allows for avoidance. The rationale is that behavioral adaptations due to given uncertainty will tend to be in line with the social interest.

Undoubtedly, the preceding analysis leaves topics relating to avoidance untouched. Work that lies ahead of us comprises, for instance, the sanctionability of avoidance. It can be expected that results along these lines will critically depend on assumptions on the verifiability and the recursiveness of avoidance. It is usually assumed that avoidance is unverifiable which precludes conditioning a sanction on avoidance (Malik 1990, Innes 2001). If it is assumed that avoidance is verifiable at reasonable cost, the possible recursiveness of avoidance needs to be considered when determining the optimal policy. Sanchirico (2006) argues that sanctioning first-order avoidance will increase second-order avoidance efforts, and so forth. This may question the desirability of sanctioning avoidance.

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