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ABSTRACT

The standard economic analysis of liability rules primarily focuses on the direct accident costs eligible for compensation. However, accidents often create other costs that are as large as, or even higher than, the direct accident costs, which remain uncompensated because their compensation is legally inadmissible or impracticable. In this paper, we present a simple model of the uncompensated tertiary and third-party costs associated with accidents. We show that including these costs in the conceptualization of the due level of care, even without increasing compensation, significantly improves the relative efficiency of fault liability over strict liability. We show that if the due care level is enhanced appropriately to account for the uncompensated costs, fault liability yields higher social welfare than the standard strict liability. This claim holds even under variable activity levels. We show that the welfare-maximizing and incentive-compatible due care level is higher than what Hand's rule will suggest. Further, the superiority of fault liability with enhanced care standard over strict liability increases with the importance of uncompensated costs relative to direct accident costs. Moreover, the fault-based liability, we propose, provides an "error-tolerant" mechanism and performs better than the alternatives across several categories of accidents. Thus, we provide a new case for the high-standard-based fault liability vis-à-vis strict liability.

Keywords: Accidents, Hand Rule, Uncompensated Tertiary Costs, Third-party Costs, Punitive Damages, Fault-liability, Strict Liability, Activity Levels

JEL codes: K13, D62

1. Introduction

The standard economic analysis of liability rules mainly focuses on the direct accident costs. That is, the victim's accident loss and the accident-prevention costs for the parties involved. Often, accidents create additional costs. One example of such costs is the tertiary cost of accidents, as described by Calabresi (1970). The “tertiary accident costs” are not the primary injury or harm to the victim, nor the victim’s direct consequential losses (like medical bills or lost earnings), but rather are incidental to the accident.

The tertiary costs arise in the course of dealing with the accident losses falling on the victim. The tertiary costs include the tortfeasor's and the victim's litigation costs, legal advice costs, and the administrative costs of settling insurance claims with the parties' insurers. They also include the costs of police investigation and the justice system used to adjudicate the disputes between tortfeasors and their victims. These costs are not compensable under the tort law. Some of these costs fall on taxpayers who are not eligible for compensation. A part of the tertiary costs falls on the plaintiffs in the form of non-physical pain or other non-pecuniary losses associated with the accident, the disutility of non-financial litigation efforts, or the victims' waiting in an accident-related traffic jam. Some of these costs can fall on third parties, such as insurance companies' handling costs.

The limited empirical literature on the subject suggests that uncompensated tertiary costs are frequently as large as — and often larger than — direct costs, especially for severe injuries and fatalities. The ratio of tertiary costs to direct costs varies by accident type (healthcare vs construction vs transport), and by severity of accident for a given type. See Chen, Simiao et al. (2019), Bougna et al. (2022), and Riuttanen, A., Karjalainen, E., Jokihaara, J. et al. (2024), among others. Most tertiary costs are not compensated, though there are exceptions.[1]

Besides, on several occasions, accidents impose external costs on parties other than those involved directly. For instance, road accidents that result in broader system disruptions impose external costs by causing traffic jams and other disruptions. The effects of environmentally hazardous accidents can extend far beyond the parties with a legal claim as victims. At times, the uncompensated external costs can be substantial and often much higher than the direct accident costs. See Coleman (2005).

[1] For instance, in some German states football clubs must pay for the police costs, when the police controls and arrests hooligans inside and outside the football stadium.

In this article, we model the tertiary costs discussed by Calabresi, as well as the third-party costs arising from accidents. In the existing literature, these costs have been analyzed from the perspective of including them under the scope of compensation and their incentive effects. See, e.g., Bernstein (1998), Posner (2006), Schweizer (2007), and Faure and Weber (2015). For further details on tertiary costs and their implications, see Cardillo and Schäfer (2022).

To start, we focus on the incentives for prevention efforts in the presence of tertiary and external costs, within the standard framework in which compensation is limited to the defendant's compensable losses. In other words, we take it that the features of tort law that lead to non-compensation for some damages remain unchanged. For simplicity, we examine unilateral care accidents but allow the injurer's activity to be a given constant or a variable of choice. In the standard setup (that is, without factoring in tertiary and third-party costs) of unilateral care accidents with variable activity levels, the literature shows that the strict liability rule is more efficient than the fault-based liability rule.[2] We show that the inclusion of non-compensable tertiary and third-party costs significantly changes the relative efficiency of fault liability compared to strict liability.

Our analysis offers practical suggestions for accident contexts in which a substantial part of the total costs of accidents cannot or must not be compensated, but in which courts have discretion to set an enhanced standard of due care under fault liability. We show that the fault liability with an appropriately adjusted due-care level yields high social welfare, even under variable activity levels. Specifically, once the tertiary and third-party costs are factored in, an increase in the due care level beyond the regular due care level is welfare-enhancing.

Further, we discuss how fault liability with an enhanced standard of care performs compared to possible alternatives under tort law to improve incentives for tortfeasors, such as increasing damages to cover tertiary losses, punitive damages, and all tertiary and third-party costs of accidents. We demonstrate that our proposal of faulty liability with an enhanced level of due care provides an "error-tolerant" mechanism and performs better than the alternatives across several categories of accidents.

Thus, we provide a new case for the high standard (due care) based fault liability vis-à-vis strict liability.

Feldman and Singh (2021) show that the strict liability can dominate the fault liability even for bilateral care accidents.

Our results add a new dimension to the literature on the efficiency of fault liability over strict liability. The existing literature has shown that when activity levels are given constant and damages are based only on direct accident costs, fault liability is superior to strict liability in terms of care choice in the face of judicial errors regarding the harm and due care level (Singh 2003, and Singh 2004). Besides, fault liability is better at aggregating information and screening at-fault parties (Schäfer and Müller-Langer, 2009). Under certain conditions, the fault liability is shown to reduce the costs of adjudication errors and/or improve deterrence. E.g., see Hylton (1990), Feess and Wohlschlegel (2006), and Lando (2020). In contrast, our paper demonstrates that the faulty liability with an enhanced due care standard induces more efficient care and activity levels. We show that the superiority of fault liability over strict liability increases with the importance of uncompensated tertiary costs relative to direct accident costs.

We find it pertinent to contrast our paradigmatic case and results from two notable contributions on related but significantly different contexts. First is the work of Ganuza and Gómez (2008). This paper examines accidents in contexts where the legal damages awarded are equal to the total loss, but the defendant's wealth is less than the compensation awarded. This starting point differs greatly from our research question. Ganuza and Gómez present the paradigmatic case of an oil spill near the Spanish border involving a ship flying a foreign flag. The defendant's wealth, which can be mobilized to compensate for damages - the value of the ship after the accident and the insurance coverage - is much less than the damage, thus causing under-compensation and under-deterrence, even if the courts chose a due care level equal to the socially efficient level. For such contexts, the authors show that a second-best due care level is lower than that required under the Learned Hand criterion.

In contrast, in our setup, there is no judgment-proof problem. We examine the implications of the law's exclusion of certain damages and losses from compensation. We show that the welfare-maximizing and incentive-compatible due care exceeds what follows from the Learned Hand rule. Moreover, the second-best due care is not simply a parametric multiple of the due level of care under the Hand rule; it is more complex and depends on whether the activity level is constant or a variable of choice.

The other contribution relevant to our analysis is by Cooter and Porat (2001). This paper examines the following important question: How should courts treat non-legal sanctions, such as reputational harm, social ostracism, or boycotts, that a wrongdoer suffers? Cooter and Porat show that to avoid overdeterrence of wrongdoers, courts should generally deduct the burden of non-legal sanctions they suffered from the compensatory damages owed to the victim. In contrast, in our set, the

problem is one of under-deterrence, driven by a different underlying dynamic, leading us to derive different results.

In Section 2, we present a simple model of uncompensated tertiary and third-party costs. In Section 3, we show that fault liability is more efficient than strict liability for unilateral care accidents with a constant activity level. We also show that comprehensive changes to tort law rules can yield outcomes similar to those of a simple, limited reform, such as a redefinition of the due care standard. However, the enhanced care level offers comparative advantages over alternatives. Section 4 extends these claims by allowing activity level to be a choice variable. In Section 5, we compare our proposal for fault liability with other possible tort law alternatives to improve incentives for tortfeasors. We demonstrate how our proposal provides an "error-tolerant" mechanism for several categories of accidents. Section 6 concludes with the main findings.

2. Accident costs and the social welfare

First, we consider the constant (single) activity accidents. An injurer engages in a risky activity with a level normalized at the unit level. Let D denote the cost of the accident, initially borne by the victim. D depends on the care level exercised by the injurer during the activity. Formally, D, is a decreasing function of the injurer's care choice x; $D'(x) < 0$, $D''(x) > 0$ and $\lim_{x\to\infty} D'(x) = 0$.

We define the direct cost of an accident as the losses inflicted on the victim and the cost of care, i.e., $D(x) + x$. Much of the literature on unilateral care accidents focuses on these costs. We extend the analysis to include the uncompensated tertiary and third-party costs described above. To keep things simple, we take the tertiary (additional) costs associated with the accident to be an $\alpha \geq 0$ multiple of the accident costs, $D(x)$. We take the tertiary and third-party costs parameter to be exogenously given. We will revert to this issue in the last section.

Specifically, factoring in all the expenses, including the indirect costs, the total costs of the accident can be expressed as:

$$(1 + \alpha)D(x) + x.$$

Let B_0 denote the fixed benefits to the injurer from the activity. By assumption, there are no other benefits from the activity. So, for any given level of $\alpha \geq 0$, the social welfare function becomes:

$$W(x, \alpha) = B_0 - [(1 + \alpha)D(x) + x].$$

Note that for any given α, $W(x,\alpha)$ is a concave function of x with the first order condition (FOC): $(1+\alpha)D'(x)+1=0$. Assuming an interior solution, the socially optimum care, $x^*(\alpha)$ solves: $(1+\alpha)D'(x^*(\alpha))+1=0$, i.e.,

$$-D'(x^*(\alpha))=\frac{1}{(1+\alpha)} \qquad (1)$$

Clearly, the socially optimum care, $x^*(\alpha)$, is increasing in α.

Let, $W^*(\alpha)$ denote the maximum social benefit from the activities for a given α, which is attained when the care level is efficient, $x^*(\alpha)$. By definition,

$$W^*(\alpha)=W(x^*(\alpha),\alpha)=B_0-\left[(1+\alpha)D\left(x^*(\alpha)\right)+x^*(\alpha)\right].$$

In view of $(1+\alpha)D'\left(x^*(\alpha)\right)+1=0$, differentiating the term $(1+\alpha)D\left(x^*(\alpha)\right)+x^*(\alpha)$ with respect to α gives us $\frac{d}{d\alpha}\left[(1+\alpha)D\left(x^*(\alpha)\right)+x^*(\alpha)\right]=D\left(x^*(\alpha)\right)>0$. Therefore, $\frac{dW^*}{d\alpha}=-D\left(x^*(\alpha)\right)<0$, i.e., the maximum possible level of social welfare decreases with the indirect cost parameter α.

Next, let us consider accident contexts with variable activity levels. Let,

z denote the activity level;

$B(z)$ denote the benefit function from activity levels; $B'(.)>0$, $B''(.)<0$.

Following the mainstream, we take the direct cost of an accident *per unit* of activity to be the cost of care plus the accident costs. So, at the activity level z, the total social cost of the accident is $z[(1+\alpha)D(x)+x]$.[3] Now, for given α, the social welfare function $W(x,z,\alpha)$ depends on x as well as z, and the social optimization problem becomes:

$$Max_{\{x,z\}}\{W(x,z,\alpha)=B(z)-z[(1+\alpha)D(x)+x]\}.$$

Following the standard convention, assume that for any given α, $W(x,z,\alpha)$ is a concave function of x and z. As before, the optimum care expenditure will solve the following first-order condition:[4] $W_x(.)=(1+\alpha)D'(x)+1=0$. So, the socially optimum care, $x^*(\alpha)$ still satisfies:

$$-D'(x^*(\alpha)\,)=\frac{1}{(1+\alpha)}$$

[3] For a review of the literature on this point see Feldman and Singh (2021).

[4] Note that the accident cost minimizing level of care level will minimize $[(1+\alpha)D(x)+x]$, regardless of the level of activity chosen by the injurer.

That is, condition (1) defined above holds, and as before, $x^*(\alpha)$ is increasing in α.

The first order condition for the activity level is: $W_Z(.) = B'(z) - [(1+\alpha)D(x) + x] = 0$. Specifically, the socially optimum activity level, $z^*(\alpha)$, satisfies the following first-order condition:

$$B'\big(z^*(\alpha)\big) = \big[(1+\alpha)D\big(x^*(\alpha)\big) + x^*(\alpha)\big] \qquad (3)$$

As the right-hand side of this equality is increasing in α, and $B(z)$ is concave in z, It follows that $z^*(\alpha)$ is decreasing in α. Moreover, it can be seen that

$$W^*(\alpha) = B(z^*(\alpha)) - z^*(\alpha)[(1+\alpha)D(x^*(\alpha)) + x^*(\alpha)]$$

is decreasing in α. That is, in the case of variable activity level, we get:

$$\frac{dW^*}{d\alpha} = -z^*(\alpha)D\big(x^*(\alpha)\big) < 0.$$

Summing up, from a social efficiency point of view, an increase in the uncompensated tertiary and the external costs requires an increase in the care level with a simultaneous decrease in the activity level. The overall effect is a reduction in the net social welfare.

In the next section, we compare the relative efficiency of the fault liability with the strict liability in the single activity case. Our focus is on α>0 case.

3. Constant (Single) Activity Accidents

For the efficiency comparisons, we derive the injurer's choice of care under strict liability and fault liability. The standard formulation of these rules does not account for the tertiary costs.

3.1 Strict Liability

Under strict liability, a tortfeasor bears only the direct cost of the accident. So, his optimization problem is

$$Max_{\{x\}}\{B_0 - [D(x) + x]\}.$$

Let,

x^S denote the privately optimum care level for the injurer.

In our set-up, x^S, solves the following first-order condition:

$$-D'(x) = 1 \qquad (4)$$

From the FOC (4), it is clear that the cost parameter α plays no role in the self-interested care choice by the injurer. So, his care choice remains x^S, regardless of the value of α. From a comparison of (1) and (4) above, we can see that the self-interested care choice by the tortfeasor facing strict liability, x^S, is inadequate for all $\alpha > 0$, i.e., $x^S < x^*(\alpha > 0)$. x^S is equal to x^* only in the special case of $\alpha = 0$. Formally, $x^S = x^*(\alpha = 0)$. Furthermore, under strict liability, the injurer's total costs add up to: $D(x^S) + x^S = D(x^*(0)) + x^*(0)$.

3.2 Fault Liability with a higher standard

We consider fault liability as an injurer's liability under the simple rule of negligence. Under the standard formulation of fault liability, due care is set at a level that is efficient level provided uncompensated tertiary and third-party costs are not taken into account. In terms of our notations, this level is given by the care level $x^*(0)$. Therefore, under the standard fault liability, the injurer can avoid liability simply by spending $x^*(0)$ on care.

Under the standard Hand rule, the burden on the injurer of taking additional precautions is compared to the reduction in the expected loss to the victim. The injurer's liability arises only if the former is less than the latter – the tertiary costs, including the cost of administering the rule, are not taken into account (Epstein (2009)). Formally speaking, application of the standard Hand rule will also hold the injurer liable only if his care choice is less than $x^*(0)$.

In contrast, we will show that a fault liability with due care higher than $x^*(0)$ can deliver better results in the presence of tertiary and third-party costs. Let,

x^D denote the Due Care standard under the fault liability (negligence rule), and

If the injurer complies with the due care standard, his payoff is $B_0 - x^D$. If his chosen care, x, is less than x^D, he bears all direct costs of the accident. So, the tortfeasor's payoffs can be expressed as:

$$B_0 - x \; if \; x \geq x^D$$
$$B_0 - [D(x) + x]; otherwise$$

When an injurer's care choice, say x is less than x^D, he is fully liable, and his total private cost becomes $[D(x) + x]$, which is minimized at x^S, as defined above. So, a negligent injurer will end up bearing costs $D(x^S) + x^S$, whereas a non-negligent injurer's cost will be simply x^D.

The injurer will opt for either x^D or x^S depending on whether x^D is less than or greater than $D(x^S) + x^S$. It is incentive compatible for the injurer to comply with the due care level, x^D, as long as

$$x^D \leq D(x^S) + x^S.$$

Also, from the above, we know that $x^*(\alpha)$ is increasing in α, whereas $D(x^S) + x^S$ is a fixed number. Let, $\bar{\alpha}$ solve $x^*(\alpha) = D(x^S) + x^S$. That is, we define:[5]

$$x^*(\bar{\alpha}) = D(x^S) + x^S = D(x^*(0)) + x^*(0). \quad (5)$$

In effect, the injurer's costs will be x^D or $x^*(\bar{\alpha})$, whichever is smaller. In particular, note that if the due care level $x^D \leq x^*(\bar{\alpha})$, the injurer will choose the due care.

Now, suppose under fault liability, the due care is set at $x^D = Min\{x^*(\alpha), x^*(\bar{\alpha})\}$. See Figure 1

When $\alpha \leq \bar{\alpha}$, $x^*(\alpha) \leq x^*(\bar{\alpha})$, so $x^D = x^*(\alpha)$ and the injurer will choose x^D. That is, when $x^D = x^*(\alpha)$, choosing the socially optimum care level $x^*(\alpha)$ is incentive compatible for the injurer. Even though the cost parameter α does not play any direct role in the self-interested care choice by the injurer. Still, the outcome is an efficient care choice by the injurer. For $\alpha > \bar{\alpha}$, $x^*(\alpha) > x^*(\bar{\alpha})$ but $x^D = x^*(\bar{\alpha})$, and the injurer will again choose to comply with the due care. Let,

x^N denote the payoff-maximizing choice by the tortfeasor under negligence liability.

The privately optimum choice under negligence liability can be summed up as: When $\alpha \leq \bar{\alpha}$, $x^N = x^*(\alpha)$; and when $\alpha > \bar{\alpha}$, $x^N = x^*(\bar{\alpha})$.

3.3 Efficiency Comparison

In view of the above, under the rule of strict liability, the injurer will choose $x^S = x^*(0)$, regardless of the value taken by the tertiary cost parameter, α. So, for any given α, under strict liability, the social welfare, W^S, can be expressed as:

$$W^S(\alpha) = W(x^*(0), \alpha) = B_0 - \left[(1+\alpha)D\left(x^*(0)\right) + x^*(0)\right].$$

Since, $\alpha > 0$ means $x^*(0) < x^*(\alpha)$, it is easy to see that $W^S(\alpha) < W^*$.

[5] A solution to (5) is guaranteed by assuming $\lim_{\alpha \to \infty} x^*(\alpha) = \infty$.

Under standard faulty liability the due care is set at $x^*(0)$, which is incentive compatible, and the net result is that the social welfare is the same as under strict liability.

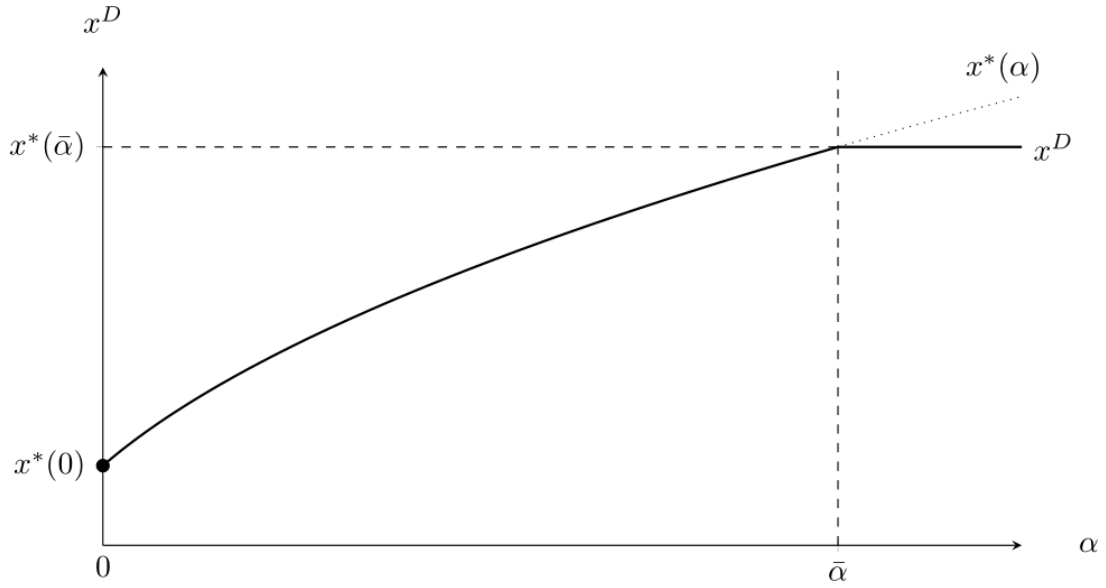
The social welfare under the fault liability with an enhanced due care, depends on α as well as the injurer's care choice, x^N. As shown above, $x^N = x^D$, where $x^D = Min\{x^*(\alpha), x^*(\bar{\alpha})\}$. So, the care choice itself depends on α. There are two possible cases regarding α.

Case 1: Consider any $0 < \alpha \leq \bar{\alpha}$. In this case, $x^N = x^*(\alpha)$, as discussed above. Letting W^N denote the social welfare under faulty/negligence liability,

$$W^N\big(\alpha | x^N = x^*(\alpha)\big) = W(x^*(\alpha), \alpha) = B_0 - \big[(1+\alpha)D\big(x^*(\alpha)\big) + x^*(\alpha)\big]$$

Therefore, for the case $\alpha \leq \bar{\alpha}$, $W^N\big(\alpha | x^N = x^*(\alpha)\big) = W^*$, whereas $W^S(\alpha) < W^*$. Hence, $W^S(\alpha) < W^N\big(\alpha | x^N = x^*(\alpha)\big)$ in this case.

Figure 1: Relationship between the due care, x^D, and α, under fault liability[6]



Case 2: Now consider the case $\alpha > \bar{\alpha}$. In this case, $x^*(\alpha) > x^*(\bar{\alpha})$. However, the due care level is fixed at $x^*(\bar{\alpha})$. As is shown above, in this case, $x^N = x^D = x^*(\bar{\alpha}) > x^*(0)$. That is, the care choice by the injurer is less than the first best but greater than the care choice under strict liability. Consequently, the social welfare is given by:

[6] Here we have shown $x^*(\alpha)$ to be concave in α. Depending on the context, $x^*(\alpha)$ may or may not be concave but it is always increasing in α.

$$W^N\left(\alpha\middle|x^N = x^*(\bar{\alpha})\right) = W(x^*(\bar{\alpha}), \alpha) = B_0 - \left[(1+\alpha)D\left(x^*(\bar{\alpha})\right) + x^*(\bar{\alpha})\right]$$

As $x^*(0) < x^*(\bar{\alpha}) < x^*(\alpha)$ and the social welfare function, W, is concave, we can conclude that: $W^N\left(\alpha\middle|x^N = x^*(\alpha)\right) = W(x^*(\bar{\alpha}), \alpha) > W(x^*(0), \alpha) = W^S(\alpha)$.[7] Therefore, in this case also, the social welfare is higher under the fault liability with an enhanced standard. The following proposition sums up the results so far.

Proposition 1: For all $\alpha > 0$, (i) the negligence rule with higher standards is superior to the rule of strict liability. Additionally, for all $\alpha \leq \bar{\alpha}$, the fault liability achieves the first best; (ii) Relative efficiency of the fault liability increases with α.

To see the logic behind the second claim, note that: $\frac{dW^S(\alpha)}{d\alpha} = -D\left(x^*(0)\right) < 0$, i.e., the social welfare under strict liability is decreasing in α. Similarly, for the fault liability $\frac{dW^N\left(\alpha\middle|x^N = x^*(\bar{\alpha})\right)}{d\alpha} = -D\left(x^*(\bar{\alpha})\right) < 0$, when $\alpha > \bar{\alpha}$; and $\frac{dW^*}{d\alpha} = -D\left(x^*(\alpha)\right) < 0$ for $\alpha \leq \bar{\alpha}$. Therefore, the social welfare under fault liability also decreases with α under both the cases discussed above. For $\alpha > \bar{\alpha}$, $\frac{dW^N(\alpha)}{d\alpha} - \frac{dW^S(\alpha)}{d\alpha} = -D\left(x^*(\bar{\alpha})\right) + D\left(x^*(0)\right) > 0$. For $\alpha \leq \bar{\alpha}$, $\frac{dW^N(\alpha)}{d\alpha} - \frac{dW^S(\alpha)}{d\alpha} = -D\left(x^*(\alpha)\right) + D\left(x^*(0)\right) > 0$. In both cases, the fault liability becomes more efficient than strict liability, as α increases.

4. Variable Activity Levels

In this section, we compare the relative efficiency of fault lability for the accidents with variable activity levels.

4.1 Strict Liability

Under strict liability, the tortfeasor's optimization problem becomes:

$$Max_{\{z,x\}}\{B(z) - z[D(x) + x]\}.$$

The privately optimum care level, x^S, still solves:

$$-D'(x) = 1$$

[7] As α does not affect the care choice of the injurer under strict liability, so the social welfare under the strict liability remains unchanged at $W^S(x^*(0), \alpha) = W^S(\alpha)$, as defined above.

This means that the payoff-maximizing choice of x is independent of the choice of activity level, z. Moreover, $x^S = x^*(0)$, as defined above. Given the choice of x^S as care level, the privately optimum activity level solves the following FOC:

$$B'(z) = D(x^S) + x^S = D\big(x^*(0)\big) + x^*(0) \qquad (6)$$

Let, z^S solve the solution to the above condition. Since $\big[(1+\alpha)D\big(x^*(\alpha)\big) + x^*(\alpha)\big]$ is an increasing function of α and $B(z)$ is concave, a comparison of (3) and (6) shows that $z^S > z^*(\alpha)$.

To sum up, under strict liability, the tortfeasor takes less than socially optimum care and engages in excessive activity level.

4.2 Fault Liability

Under standard faulty liability the due care is set at $x^*(0)$. As is well known in the literature, while choice of $x^*(0)$ is incentive compatible for the injurer, his activity choice is excessive. He will choose activity that surpasses even z^S, which in itself is inefficiently high. So, the standard fault liability leads to social welfare even smaller than strict liability.

To see the effect of enhanced due care levels, suppose the due care level is fixed at $x^*(\bar{\alpha})$, i.e., $x^D = x^*(\bar{\alpha})$, where $x^*(\bar{\alpha}) = D(x^S) + x^S = D(x^*(0)) + x^*(0)$, as defined in (5) above. This choice of due care is different from the standard fault liability (with $x^*(0)$ as the due care). In particular, our choice of due care is higher than the standard formulation for all $\alpha > 0$. Under this higher standard of care, the injurer's payoff can be expressed as:

$$B(z) - zx \; if \; x \geq \; x^*(\bar{\alpha});$$
$$B(z) - z[D(x) + x], otherwise$$

Specifically, our choice of the due care is higher than what will follow from the Learned Hand rule, i.e., $x^*(0)$, and is more complex when the activity level is a variable of choice.

However, it is easily seen that it is incentive compatible for the injurer to comply with the due care levels as long as $x^D \leq D(x^S) + x^S$. In particular, at $x^D = x^*(\bar{\alpha})$ the injurer will comply with the due care level. Formally put, the tortfeasor's care choice under fault liability, $x^N = x^*(\bar{\alpha})$, regardless of the value of the tertiary-costs parameter.

Moreover, the injurer's payoff-maximizing activity choice under fault liability, z^N, will satisfy the following condition:

$$B'(z) = x^*(\bar{\alpha}) = D(x^*(0)) + x^*(0). \quad (7)$$

From (6) and (7) above, we can see that $z^N = z^S$. As in the case of strict liability, under fault liability also, the privately optimum activity choice is independent of the actual value of the parameter α.

To summarize the outcome under fault liability with enhanced due care level, the injurer's activity choice will be the same as under strict liability, i.e., $z^N = z^S$. However, his care choice will be $x^*(\bar{\alpha}) > x^S$. Both choices are independent of α. Even in the special case of $\alpha = 0$, $x^N = x^*(\bar{\alpha})$ and $z^N = z^S$.

4.3 Efficiency Comparison

Under strict liability, the tortfeasor chooses $x^*(0)$ as care and z^S as activity level. So, the social welfare is given by $W^S(\alpha) = W(x^*(0), z^S, \alpha) = B(z^S) - z^S\big[(1+\alpha)D\big(x^*(0)\big) + x^*(0)\big]$. Clearly,

$$\frac{dW^S(\alpha)}{d\alpha} = -z^S D\big(x^*(0)\big) < 0. \quad (8)$$

In contrast, under fault liability with due care set at $x^*(\bar{\alpha})$, the injurer will opt to comply with the due care and will choose the activity $z^N = z^S$. So, the social welfare can be expressed as:

$$W^N\big(\alpha \big| x^D = x^*(\bar{\alpha})\big) = W(x^*(\bar{\alpha}), z^S, \alpha) = B(z^S) - z^S\big[(1+\alpha)D\big(x^*(\bar{\alpha})\big) + x^*(\bar{\alpha})\big].$$

This gives us,

$$\frac{dW^N\big(\alpha \big| x^D = x^*(\bar{\alpha})\big)}{d\alpha} = -z^S D\big(x^*(\bar{\alpha})\big) < 0. \quad (9)$$

Now, the following two cases arise.

Case 1: First, consider the case $\alpha \geq \bar{\alpha}$. As noted in Section 4.2, for the case $\alpha \geq \bar{\alpha}$, we have $x^*(0) < x^*(\bar{\alpha}) \leq x^*(\alpha)$. As the care choice by the injurer, i.e., $x^*(\bar{\alpha})$, is less than the first best but greater than the tortfeasor's care choice under strict liability. The activity choices, on the other hand, are identical under the two rules. This, in view of the concavity of the function W, implies: for any given $\alpha \geq \bar{\alpha}$, $W(x^*(\bar{\alpha}), z^S, \alpha) > W(x^*(0), z^S, \alpha)$. That is,

$$W^N\big(\alpha \big| x^D = x^*(\bar{\alpha})\big) = W(x^*(\bar{\alpha}), z^S, \alpha) > W(x^*(0), z^S, \alpha) = W^S(\alpha).$$

In other words, for all possible values of $\alpha \geq \bar{\alpha}$, social welfare is strictly higher under the fault liability.

Case 2: Now consider the case of $0 < \alpha < \bar{\alpha}$. Recall, both the strict liability and the fault liability induce the same levels of activity level, for all values of α. Furthermore, the care choice under strict liability x^S is independent of α, and $x^S = x^*(0) < x^*(\alpha)$. However, the injurer's care choice under the fault liability $x^*(\bar{\alpha})$ is greater than the socially efficient care, $x^*(\alpha)$. Therefore, in the case of $0 < \alpha < \bar{\alpha}$, while the strict liability induces too little care, the care under the fault liability is excessive. Therefore, the comparative efficiency of the two rules is not apparent.

However, we have seen that at $\alpha = \bar{\alpha}$, $W^N\big(\alpha \big| x^D = x^*(\bar{\alpha})\big) > W^S(\alpha)$. On the other hand, at $\alpha = 0$, $W^N\big(\alpha = 0 \big| x^D = x^*(\bar{\alpha})\big) < W^S(\alpha = 0)$. To see why this is the case, note that when $\alpha = 0$, the social welfare maximizing care and activity levels are $x^*(0)$ and z^S, respectively. But, these are also the actual choices by the tortfeasor under the strict liability. This gives us: $W^S(\alpha = 0) = W^*$.

That is, the strict liability attains the highest possible social welfare when $\alpha = 0$. Under the fault liability, with due care set at $x^*(\bar{\alpha})$, the injurer always sticks to the due care, which is excessive when $\alpha = 0$. Therefore, $W^N\big(\alpha = 0 \big| x^D = x^*(\bar{\alpha})\big) < W^*$. Specifically,

$$W^S(\alpha = 0) - W^N\big(\alpha = 0 \big| x^D = x^*(\bar{\alpha})\big) = z^S\big[D\big(x^*(\bar{\alpha})\big) + x^*(\bar{\alpha}) - D\big(x^*(0)\big) - x^*(0)\big]$$
$$= D\big(x^*(\bar{\alpha})\big).$$

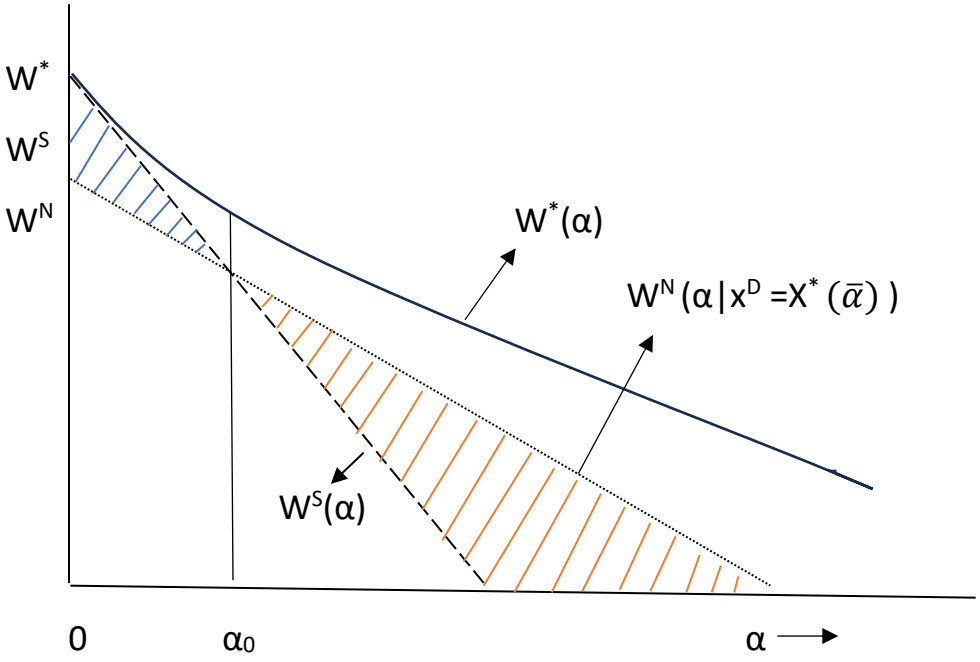
Now, $W^N\big(\alpha = 0 \big| x^D = x^*(\bar{\alpha})\big) < W^S$ and $W^N\big(\alpha = \bar{\alpha} \big| x^D = x^*(\bar{\alpha})\big) > W^S(\alpha)$, together imply that there exists α_0 such that: $0 < \alpha_0 < \alpha_0$, and

$$W^N\big(\alpha_0 \big| x^D = x^*(\bar{\alpha})\big) = W^S(\alpha_0).$$

From (8) and (9), it can be seen that both $W^S(\alpha)$ and $W^N(\alpha)$ are both downward slopped straight lines. The slop is higher for $W^S(\alpha)$. See Figure 2. Solving $W^N\big(\alpha_0 \big| x^D = x^*(\bar{\alpha})\big) = W^S(\alpha_0)$, we get $\alpha_0 = \frac{D\left(x^*(\bar{\alpha})\right)}{D\left(x^*(0)\right) - D\left(x^*(\bar{\alpha})\right)} > 0$.

The following proposition summarizes the results.

Figure 2: *Comparison of social welfare under different liability regimes with the first best*



Proposition 2: There exists $\alpha_0 > 0$, such that for all $\alpha \geq \alpha_0$, the negligence rule is superior to the rule of strict liability. For $\alpha < \alpha_0$, strict liability is more efficient.

Even though the threshold value α_0 is expected to vary across contexts, this is a general result showing that if α surpasses a threshold value then fault liability with enhanced level of due care trumps strict liability. In simpler terms, when the uncompensated tertiary and external costs of accidents exceed a certain threshold, the fault liability system yields a more efficient outcome (orange shaded area). Strict liability is a better choice only when these costs are relatively low (blue shaded area).

Furthermore, from (8) and (9), we see that as α increases the rate of decrease in social welfare is higher under strict liability. Moreover,

$$\frac{d}{d\alpha}\left[W^N\left(\alpha|x^D = x^*(\bar{\alpha})\right) - W^S(\alpha)\right] = z^S\left[D\left(x^*(0)\right) - D\left(x^*(\bar{\alpha})\right)\right] > 0.$$

In other words, for $\alpha \geq \alpha_0$, the efficiency of fault liability over strict liability increases with α, i.e., with the importance of tertiary and external costs.

5. In Defense of the Enhanced Level of Care

Our analysis in Sections 3 and 4 takes as given the fact that tort law often legally or factually excludes compensation for some costs associated with accidents. Our results above show that both standard fault liability and strict liability fail to achieve the first best. However, fault liability with a diligently defined enhanced level of care achieves higher welfare than fault liability with the standard due care level, i.e., due care that does not factor in some tertiary and third-party costs. Moreover, the fault liability we propose is more efficient than strict liability.

Specifically, fault liability with appropriately enhanced levels of care can achieve the first best if the socially optimal due care level does not exceed the sum of the privately profit-maximizing costs of care and the standard damage award, excluding compensation for tertiary and external costs. In accident contexts where this condition is not met, tortfeasors would prefer to disregard the enhanced and socially optimal due care and pay the standard damages instead. If, however, courts choose a moderately enhanced level of due care, which is lower than the social optimum but still incentive-compatible, the result is a second-best outcome. The net result is an improvement in social welfare compared with fault liability under the standard of due care and strict liability.

These results imply that social welfare can be improved by adjusting a single policy variable: the level of due care. We regard this as an important result because it can help achieve a better outcome by reforming only a single element of tort law, the choice of the due level of care. The rest of the tort law need not be changed.

However, our findings raise several important questions. The first of these questions is: If the legal system knows the tertiary and third-party costs associated with an accident, why to neglect them? Why not include them in the design of the basic standard liability rules? After all, if the legal system were to incorporate all of the uncompensated costs, the rule of strict liability could achieve the first-best outcome. In contrast, our proposed fault liability with enhanced care achieves only the second-best outcome. Therefore, the question becomes: Why focus on second-best measures when the first-best solution is achievable? Seen from this perspective, the issue becomes whether the problem we are trying to solve (legally excluding compensation for tertiary and external costs) is an exogenous factor to tort law or deliberate chosen aspects of tort law.

5.1 Benevolent Neglects

A plausible reference point in this regard is the interesting findings in Ganuza and Gómez (2008). They show that the best possible standard of care differs from the Learned Hand rule when the defendant is judgment-proof.

The judgment-proof tortfeasors are generally seen as an exogenous effect – something that affects the functioning of the tort law but cannot be changed by the legal system. Indeed, on first reflection, it is tempting to treat judgment-proof defendants as exogenous to the legal system. In contrast, the decision not to compensate for some of the damages seems a policy/legal decision that can be changed within the confines of the legal system.

We argue that several of the imperfections in the outcomes of standard rules we attribute to "exogenous" and "unavoidable" factors (for the policymaker) are self-inflicted by the legal system. For instance, the extent and degree of the judgment-proof problem are, in large part, a consequence of the legality of the limited company, which was gradually accepted by legal orders worldwide, starting in the middle of the 19th century. Many of the judgment-proof problems would disappear or be reduced in degree if the legal limits on personal liability above the capital at risk were not there.

It is noteworthy that the limited liability corporation (Aktiengesellschaft and Gesellschaft mit begrenzter Haftung) was highly disputed, especially in Germany, precisely because it increased the prevalence of the judgment-proof problem. The eminent economist Walter Eucken, head of the Freiburg School of Economics, argued in the 1950s that the law should not allow the existence of limited liability companies (LLCs), which shield the personal wealth of promoters from the risks of the wealth invested in the LLCs. According to him, the very existence of limited liability companies violates the principle of personal liability, which is essential for a market economy. To quote Eucken: "Those who benefit must also bear the costs. This is one of the fundamental principles of justice, but also one of the fundamental principles for establishing a functioning economic system. [...] The limitation of liability in stock corporations and limited liability companies is therefore an anomaly in the competitive order." See Walter Eucken (1952, 2007, pp. 279).

Eucken had a point, but he failed to see the enormous economic benefits of LLCs. By shielding personal wealth from at-risk capital, these companies have played an important role in financing businesses and incentivizing people to become entrepreneurs without exposing themselves or their

families to existential risk. The legal sanctity accorded to LLCs has significantly increased the prevalence of the judgment-proof problem, but it is justified on the grounds of broader social benefits. Once we accept this, then the question becomes how to address the incentive problem associated with the judgment-proof problem, without diluting the benefits of LLCs.

From this perspective, the solutions proposed in Ganuza and Gómez (2008) are important not because the problem (judgment-proof defendants) is external to the law, but because the suggested solutions improve efficiency without sacrificing the several benefits of limiting liability to the wealth at risk.

In a similar vein, the non-compensation of tertiary and third-party costs often has sound reasons and carries significant benefits for the legal order and the economy, just as there are good reasons to accept the judgment-proof problem associated with LLCs. Our point is that raising the due care above the regular standard is an effective way to reduce the negative consequences of uncompensated tertiary and external costs, without destroying the benevolent effects associated with non-compensation of these costs.

There may be situations in which the legal neglect of compensation for tertiary and third-party costs is justified based on a cost-benefit analysis. In such cases, awarding compensation for these costs should be preferred over our proposal. At the same time, as we argue below, there can be valid (practical or legal) reasons to use our solution of raising the due care level rather than compensating for tertiary and third-party costs, even if the legal system knows of their existence.

5.2 Uncertainty over Tertiary Costs and Judicial Errors

Even if the legal system can quantify the tertiary costs, but only with large error margins, increasing damages to compensate for these costs can worsen rather than improve the outcome. This appears to be the case, especially with respect to compensation for non-pecuniary costs, such as moral damages and emotional distress. Take the case of compensation for the emotional distress suffered by surviving members and relatives of a deceased. Compensation for such losses was introduced by the German legislature as late as 2017 (Section 844, Para. 3 of the BGB). In Germany, the compensation is usually between 5.000 and 15.000 euros.[8] However, the compensation amounts on this count vary extremely across European countries, even among those

[8] See. OLG Köln (Higher Regional Court), May 5, 2022. In 18 U 168/21 and OLG Celle, Jan 18, 2024, the court awarded €10,000 for the loss of a child.

at a similar level of per capita income. According to a study by Peiffer (2018), the compensation for emotional distress upon the death of a 41-year-old father of two children amounts to €15,000 in the United Kingdom, €104,000 in France, €130,000 in Switzerland, €338,000 in Spain, and €1.3 million in Italy. In other words, the compensation varies by a factor of 100 or more.

Given the enormous differences across countries with comparable average incomes, including tertiary costs in the computation of damages under strict liability will very likely generate very different incentives for tortfeasors. Only by chance can the outcome be efficient.

In contrast, our proposal of faulty liability with an enhanced level of due care provides an "error-tolerant" mechanism for several categories of accidents. This is easy to see in light of our results in Section 3 for constant-activity-level accidents. First, consider the case of a court under estimating the tertiary and external costs and thus raising the due care level below the level we recommend. The result will not be second-best, but will still be an improvement over standard fault liability and standard strict liability.

Next, consider the case of overshooting, that is, the court mistakenly choosing an excessively high due care level. As discussed above, this creates incentives as if the legal norm were strict liability without compensation for tertiary costs. In other words, in situations of gross exaggeration, our mechanism will induce the same level of care as under standard fault liability and standard strict liability. It has the same effect as replacing fault liability with strict liability. Under such conditions, our proposal neither improves nor worsens incentives to take care, so there is no efficiency loss.

Additionally, in variable-activity accident contexts, fault liability with an enhanced care level is more efficient than standard fault liability, even when courts (mistakenly) choose a very high due care level. In such situations, as discussed above, tortfeasors would ignore the court-ordered due care and opt for care as under strict liability. Consequently, they will be treated as negligent and liable to pay standard damages. The net result is that the care activity level choices would be the same as under strict liability. But this is an improvement over the standard faulty liability, which encourages excessive activity choice by tortfeasors.

Therefore, in the face of very high uncertainty about the values of α (a measure of tertiary and third-party costs) and, hence $x^*(\alpha)$, fault liability with a raised care standard can have a welfare-enhancing effect in several accident contexts of practical interest.

compared to the status quo, a legal norm that imposes an enhanced level of due care (without compensation for tertiary and third-party costs) raises the overall welfare in several accident contexts of practical interest.

In contrast, strict liability standards that grant excessive compensation will very likely reduce overall welfare. We therefore conclude that the rule of an enhanced standard of due care trumps the alternative of increasing compensation to account for tertiary and third-party costs, especially when uncertainty about tertiary costs might lead to extravagant compensation. The appeal of our proposal becomes more evident in situations where courts have a proclivity to help victims by applying a "deep pocket approach" in total disregard of the incentive effects of their rulings. Under such circumstances and/or when there is very high order uncertainty about the quantum of tertiary and external costs, compensating for these costs can result in welfare losses relative to the status quo.

5.3 Punitive damages

Often, a part of the accident losses remains unrecovered, not because substantive law excludes them from compensation, but because not all damages are claimed. At times, the tortfeasor remains unknown to the victim or escapes liability due to adjudication errors or for other reasons – for example, when individual claims are too low to incentivize victims to file a lawsuit. In such cases, the internalization of uncompensated costs is possible. One possible remedy is the imposition of punitive damages on tortfeasors against whom victims bring lawsuits. For instance, if the enforcement error is 50 percent, i.e., a tortfeasor pays damages only with 50 percent probability, doubling compensation awards will effectively make him internalize the accident costs. Similarly, tripling of damages will correct for an enforcement error of 2/3, etc. This suggests that the use of punitive damages can lead to a first-best outcome, assuming enforcement errors are the same across a particular class of cases. In contrast, for our proposal to achieve efficient deterrence, the enhanced level of care would have to be efficient and incentive-compatible. As shown above, this is not always the case – at times, efficient due care is not incentive-compatible. Therefore, punitive damage can outperform the alternative of an enhanced level of care.

However, punitive damages, by design, introduce an element of punishment into civil liability cases. Almost all European legal regimes regard punishment under tort law as a violation of public order. European legal orders draw a sharp line between criminal law and the law of obligations, as well as between criminal law and private property. Punishment under tort law and under the civil procedure is regarded as private punishment and therefore unconstitutional. Here, the primary

objection is that punitive damages under tort law (which follows civil procedure) amount to "private punishment" without the constitutional safeguards that usually accompany the power to punish.

In civil cases, the standard of proof is usually the "preponderance of evidence" (more likely than not). In criminal/punitive matters, by contrast, the standard is "beyond a reasonable doubt," a probability that borders on certainty. Awarding a penalty in the form of punitive damages on a "more likely than not" basis is seen as a violation of the standard of proof. Criminal punishment is also based on the presumption of innocence. Further, in a criminal context, the defendant has a "right to remain silent." By contrast, in civil discovery, parties are often required to produce documents or testify. Additionally, the burden of proof is reversed in civil cases if the defendant has greater and better access to information than the plaintiff. This onus on the defendant is incompatible with the principles of criminal justice and violates the “assumption of innocence” in criminal law.

Therefore, bringing punitive damages under civil procedure allows the plaintiff to force the defendant to provide the very evidence used to "punish" them.[9] European courts, particularly in Germany and Austria, argue that a private individual has no standing to act as a prosecutor. They view this as a violation of the separation of powers. They argue that only the executive/public prosecutor decides who to punish based on public interest.[10]

Admittedly, some changes in the direction of punitive damages have occurred in EU countries, especially in the fields of European antitrust law and intellectual property law. But, basically, punitive damages are considered unconstitutional. Despite bilateral law enforcement treaties between the US and European countries, US Court orders are not enforced if they include punitive damages (Federal Supreme Court, BGH, Judgment of June 4, 1992 - IX ZR 149/91 (BGHZ 118, 312). They are not even forwarded to the defendant and returned to the American court because they violate the public order. In an exception, since 2017, Italy has moved some steps away from a categorical rejection of punitive damages toward a cautious acceptance, but under strict conditions of proportionality, legality, and public order (Court of Cassation, United Sections, Ruling No. 16601/2017). Overall, European legal orders regard the award of punitive damages as a violation of basic constitutional values.

[9] If the defendant remains silent and does not cooperate, in civil matters, the court can assume that the accusation of the plaintiff is true, an unthinkable proposition under criminal law.

[10] By comparison, in the USA, the private prosecutor is much less an alien than in Europe and stands in the tradition of times when law and order expanded only gradually from East to West in a seemingly boundless land.

Our proposal of an enhanced level of due care raises none of these constitutional concerns listed here. But, in several contexts, it can achieve either an efficient outcome or at least an improvement over the status quo. Therefore, even if the legal system can accurately assess the uncompensated costs of accidents due to enforcement errors, punitive damages are not a self-evident alternative to an enhanced level of care.

5.4 Nonpecuniary and pure economic losses

A typical illustrative example under this category is motor vehicle accidents. Road accidents cause direct losses to their victims. In addition to causing losses to victims, accidents cause traffic jams, making a large number of passengers in other vehicles wait idly as they waste their time. The law usually does not compensate for these partly nonpecuniary losses. The rationale for excluding these damages spans from the "floodgate argument". All in all, compensation for such damages is regarded as impractical.

Moreover, only some of the losses borne by the direct victims of accidents are compensated. The law usually does not compensate a victim for pure economic losses if the victim loses a profitable transaction as a result of the accident. A lost profit is treated as a pure economic loss, which, as such, is not compensated in many countries under fault or strict liability.

In the case of pure economic losses, an additional problem arises: the losses of victims are not equal to social losses, because such losses generally entail gains for third parties. If these cancel each other out, those individual losses are socially irrelevant and should not be compensated. If they do not fully offset each other, the victim's loss can exceed the net social loss. As a matter of fact, in only a few legal orders, for example, France, such damages are compensable. Even under such legal jurisdictions, compensating for pure financial losses is confronted with higher hurdles in proving causation or the extent of the damage. If net losses can be assessed and victims identified, awarding compensation will lead to higher welfare.

Summing up, there are accident related losses that the legal system does not, but should factor in while deciding damages awards and/or the due care level. If the assessment and awarding of compensation for tertiary costs and indirect third-party costs are practical, it is preferable to do so rather than not. If all the costs could be compensated, the result would be fair and first best outcome, as the costs would have been internalized by tortfeasors and all the parties bearing harm will be compensated. Therefore, for situations in which compensation for tertiary and third-party

costs can be ensured with reasonably low-cost means - say through an effective class action or other forms of compensating for widespread damages - awarding compensation for these costs should be preferred over our proposal.

However, in contexts where compensation for tertiary and indirect third-party costs is impractical or legally unacceptable, the use of our mechanism is justified. It leads to an improvement over the status quo and, in some cases, provides incentives for the first-best solution.

6. Concluding Remarks

In this paper, we have presented a simple model of uncompensated tertiary costs and third-party costs arising from accidents to examine the efficiency of fault liability (the rule of simple negligence) and strict liability. We have shown that the inclusion of tertiary and third-party costs significantly changes the efficiency of fault liability relative to strict liability. We show that the fault liability with an appropriately adjusted due care level is more efficient, regardless of whether the tortfeasor's activity is fixed or a variable of choice. We have shown that the welfare-maximizing and incentive-compatible due care level is higher than what Hand's rule will suggest. Further, the superiority of fault liability with a raised due care level over strict liability increases as the importance of tertiary costs relative to direct accident costs increases. Thus, we provide a new case for the high standard-based fault liability vis-à-vis the strict liability.

Admittedly, there can be situations where compensation for tertiary and third-party costs is a better option. In such cases, awarding of compensation for these costs should be preferred over our proposal. However, as we have detailed out in the paper, there can be valid (practical or legal) reasons to use our solution of raising the due care level rather than compensating for some tertiary and third-party costs, even if the existence of these costs is known to the legal system. As it leads to an improvement compared with the status quo and for a subset of all cases it provides incentives for the first best solution.

However, our results may or may not be valid for accidents with bilateral care and activity choices. Further research is required to determine whether and to what extent our results extend to bilateral care accidents.

Another limitation of our results is that part of the tertiary costs may depend on the liability rule itself. Adjudication of fault liability requires the plaintiff to establish harm as well as negligence. This requires fact-finding, experts' examination, and an intense discovery process, all of which are

costly. In contrast, strict liability is less demanding on the plaintiff as negligence need not be established. However, it tends to increase suit volume, thereby raising administrative costs. Further, empirical research will help compare the overall tertiary costs of the two liability regimes examined by us.

Finally, to make our point as clear as possible in this paper, we have focused only on the tertiary and administrative costs of accidents, without burdening the model with other issues. For a well-rounded comparative analysis of fault liability vis-à-vis strict liability, the analysis should also incorporate the incentive effects of social sanctions and the judgment-proof problem as described in the Introduction. This is something we might attempt in future work.

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