Caution, Children Crossing: Heterogeneity of Victim's Cost of Care and the Negligence Rule

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Abstract

Law and Economics literature has dealt with the issue of heterogeneous propensity to suffer harm [Landes and Posner (1987), Shavell (1987), Schwartz (1989), Miceli (1997)], Edlin (1998), and also with the strategic interaction in sequential torts settings [Wittman (1981), Kornhauser and Revesz (1991), Miceli (1997)]. The simple analysis of the strategic interaction in a simultaneous choice of care situation when victim's costs differ has not been object of specific attention in the literature, despite the real-world significance of heterogeneous costs of care among types of victims (children, handicapped persons, consumers instead of firms).

In the paper we characterize the optimal regulation of a standard bilateral accident setting, but where there are two different types of victims. Harm resulting from the accident is the same for the two types, but the cost of the precaution effort differs across them. The injurer and the victim precaution efforts are substitutes, with the implication that with perfect information (first-best), the efficient effort level exerted by the injurer must be higher the higher is the precaution effort cost of the victim.

This first- best solution cannot be implemented by direct legal regulation, when the injurer cannot observe the victim's type. Specifically, it cannot be implemented with the use of a negligence rule based on the first-best levels of care.

The second-best solution leads the injurer to exert an intermediate level of precautionary effort, and to the two types of victims to choose the best response to that intermediate level. This second-best solution can be easily implemented by legal rules using a negligence formula with second-best level of care as due care level. Courts cannot (and, therefore, they should not attempt to do it) implement this second-best, however, using a negligence rule based on the first-best levels of care. We explore some rationales for the use by courts of differentiated standards of care for the injurer based on the type of the actual accident victim.

1 INTRODUCTION

The standard economic model of accidents and liability, in its simplest form, assumes a world of homogenous populations of potential injurers and victims. Potential injurers are typically assumed to be identical, in terms of benefits derived from the potentially harmful activity, of costs of care, and of wealth. The same happens with victims, who are also assumed to be perfectly interchangeable in all respects. Expositions of this simple standard economic model can be found in Shavell (1987), and Schäfer and Schönenberger (1998).

It is undeniable that the real world significantly departs from this restrictive set of assumptions. Both the injurer and the victim in a given accident are drawn from heterogeneous populations of potential injurers, potential victims, and both. Some injurers derive larger, sometimes much larger, benefits than others from engaging in an activity which might result in harm to third-parties. Some injurers face larger, sometimes much larger, costs of taking care and adopting precautionary measures than others. Some injurers are wealthier, sometimes much wealthier, than others.

These departures from the simplest set of assumptions have been, to a large extent, substantially explored in the Law and Economics literature.

The heterogeneity of injurers in terms of their ability (and cost) to take care has been analyzed in economic terms, and the benefits and costs of using general and average standards of due care instead of individualized and subjective standards have been duly examined in previous work: Landes and Posner (1987), Shavell (1987), Schwartz (1989), Miceli (1997)], Edlin (1998). Similarly, wealth differences among injurers and their impact on liability rules have also been considered in the literature (Arlen (1992), Miceli and Segerson (1995))[1] .

The issues arising from victims' heterogeneity have received a good deal less of attention

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[1]The use of Tort liability as a redistribution mechanism has also been extensively discussed in the literature, although with different theoretical and policy goals in mind: Kaplow and Shavell (1994,2000), Sanchirico (2000, 2001), and Avraham, Fortus and Logue (2002).

in the literature. The source of victims' heterogeneity most extensively considered has been that related to the level of harm suffered by the victim. Landes and Posner (1987), Miceli (1997), and specially Kaplow and Shavell (1996) have analyzed the use of average versus individualized damage awards in the presence of heterogeneous victims in terms of their levels of harm resulting from an accident.

But victims, ostensibly, do not only differ in terms of the harm they are likely to experience if an accident takes places, but also in their relative ability and cost of taking care. For some types of victim, several (or many, even all) measures that may be adopted to reduce the likelihood of an accident are more costly than for other types of victim. Let's think, for instance, of children (although other examples are possible, and even widespread) compared to adults. Taking care is, for most activities in which the participant might get harmed, more costly for children than for adults. Refraining from running on the sidewalk, watching for coming autos before crossing the road, using equipment with strength and ability, or resisting the temptation of trespassing on a premise that promises some excitement, is usually easier for adults than for children. For children under a certain age, and for some of those activities, even the most obvious precautionary measures would be prohibitively costly.

These differences in the costs of taking care carry over to the determination of the optimal levels of care. Other things being equal, the costlier the care for a given victim, the lower the optimal level of care should be. This is universally acknowledged by legal systems: The levels of care that legal systems require of minors are consistently lower than those of adults. Even if still general or "objective", because they do not descend to the individual abilities and conditions of every single child, due care standard for a child is that of reasonable care not for an adult, but for a child of that age range. Evidence of this attitude across legal systems (both Common Law and Civil Law systems) can be found in Von Bar (1998) and Prosser and Keeton (1984).

In a bilateral accident setting when care measures of injurers and victims are correlated (they are substitutes, for instance), the lower optimal level of care of a given group within

the population of potential victims, increases the optimal level of care of the injurer. This issue of the interaction of victims' heterogeneity, on the one side, and levels of care of the injurer, on the other, in simultaneous choice of care situations[2], has been largely unexplored in the previous Law and Economics literature on these issues, who has, explicitly or implicitly, restricted its scope to unilateral accidents, strict liability, or both.

The goal of the paper is precisely to analyse the interaction between the levels of care of heterogeneous victims and the injurer under a negligence regime, and how different options in the application of the due care standard can bring us close or far from the optimal levels of care for victims and injurer.

The paper will be organized as follows: In section 2 we present the model and characterize the first best and the second best. In section 3 we examine the effects of the main implementation options using a negligence rule that defines due care levels as liability thresholds. Section 4 discusses the major implications of the model for the application of the negligence rule and compare them with existing rules and doctrines in different legal systems, and section 5 concludes.

2   THE MODEL

We study the standard bilateral accident setting in which the behavior of a injurer and the behavior of the potential victim, affect the likelihood of an accident but considering that there are different types of victims. In particular, we assume that there are two different types of victims θ_1 and θ_2. The ex-ante probability of type θ_1 is α, and the ex-ante probability of θ_2 is $1 - \alpha$. We assume that all the actors are risk neutral and that it is costly for the injurer and the victim to take precautions. Let $C(x)$ be the injurer cost of the precaution effort x. We assume $\frac{\partial C(x)}{\partial x} > 0$ and $\frac{\partial^2 C(x)}{\partial x^2} > 0$. While the harm resulting from the accident is the same for the two types of victims, D, victim cost of the precaution effort

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[2]There is substantial Law and Economics literature on sequential care decisions: Wittman (1981), Landes and Posner (1987), Kornhauser and Revesz (1991), and Miceli (1997).

y differs across types, $C(y, \theta)$. We assume $\theta_2 > \theta_1$, and $\frac{\partial C(y,\theta)}{\partial y} > 0, \frac{\partial^2 C(y,\theta)}{\partial y^2} > 0, \frac{\partial C(y,\theta)}{\partial \theta} > 0$ and $\frac{\partial^2 C(y,\theta)}{\partial \theta \partial y} > 0$. Finally, the probability of accident depends on the victim precaution effort y and on the injurer precaution effort x, $p(x, y)$. We assume $\frac{\partial p(x,y)}{\partial y} < 0, \frac{\partial^2 p(x,y)}{\partial y^2} > 0, \frac{\partial p(x,y)}{\partial x} < 0, \frac{\partial^2 p(x,y)}{\partial x^2} > 0$, and we assume that the injurer and the victim precaution effort are substitutes $\frac{\partial^2 p(x,y)}{\partial x \partial y} > 0$.

2.1 First best solution

We start by characterizing the first best solution in which the injurer can observe the victim type before choosing his precaution effort.

$$\max_{x_1, x_2, y_1, y_2} \alpha[-p(x_1, y_1)D - C(x_1) - C(y_1, \theta_1)] + (1-\alpha)[-p(x_2, y_2)D - C(x_2) - C(y_2, \theta_2)]$$

The next lemma show us that in the first best solution the less able victim (the one with higher cost of the precaution effort) exerts a lower level of care.

Lemma 1 $y_1^* > y_2^*$.

Proof of Lemma 1

$(x_i^*, y_i^*) \in \arg\max\{-p(x_i, y_i)D - C(x_i) - C(y_i, \theta_i)\}$. Then

$$-p(x_1^*, y_1^*)D - C(x_1^*) - C(y_1^*, \theta_1) > -p(x_2^*, y_2^*)D - C(x_2^*) - C(y_2^*, \theta_1)$$

$$-p(x_2^*, y_2^*)D - C(x_2^*) - C(y_2^*, \theta_2) > -p(x_1^*, y_1^*)D - C(x_1^*) - C(y_1^*, \theta_2)$$

Adding up the two equations and simplifying, we obtain:

$$-C(y_1^*, \theta_1) - C(y_2^*, \theta_2) > -C(y_2^*, \theta_1) - C(y_1^*, \theta_2)$$

Then

$$C(y_1^*, \theta_2) - C(y_1^*, \theta_1) > C(y_2^*, \theta_2) - C(y_2^*, \theta_1)$$

$\frac{\partial^2 C(y,\theta)}{\partial \theta \partial y} > 0$ this implies $y_1^* > y_2^*$. ∎

Given that we are assuming that the injurer and the victim precaution effort are substitutes, the next lemma is an immediate consequence of Lemma **1** and states that the injurer exerts a higher precaution effort when he is facing the high cost victim.

Lemma 2 $x_1^* < x_2^*$

Proof of Lemma 2

$(x_i^*, y_i^*) \in \arg\max\{-p(x_i, y_i)D - C(x_i) - C(y_i, \theta_i)\}$

The first order condition of x_i^* is

$$-\frac{\partial p(x_i^*, y_i^*)}{\partial x}D - C'(x_i^*) = 0$$

Applying the implicit function theorem, we obtain

$$\frac{\partial x_i^*}{\partial y_i^*} = -\frac{-\frac{\partial^2 p(x,y)}{\partial x \partial y}}{-\frac{\partial^2 p(x_i^*, y_i^*)}{\partial x^2}D - C''(x_i^*)} < 0$$

From the previous lemma we know that $y_1^* > y_2^*$, then $x_1^* < x_2^*$. ∎

2.2   Second best solution

In the second best solution the injurer can not observe the victim type. Then he chooses the same precaution effort for the two types of victims.

$$\max_{x, y_1, y_2} \alpha[-p(x, y_1)D - C(y_1, \theta_1)] + (1 - \alpha)[-p(x, y_2)D - C(y_2, \theta_2)] - C(x)$$

Similarly to the first best solution, the next lemma show us that in the second best solution the less able victim exerts a lower level of precaution effort.

Lemma 3 $y_1^{**} > y_2^{**}$.

Proof of Lemma 3

For the same argument used in the proof of Lemma **1.**

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The next lemma states that the second-best solution leads the injurer to exert an intermediate level of precautionary effort. Moreover, this precautionary effort is increasing in the ex-ante probability of facing a less able victim.

Lemma 4 $x^{**} \in [x_1^*, x_2^*]$ *and decreasing on* α. *If* $\alpha = 1$ *then* $x^{**} = x_1^*$, *if* $\alpha = 0$ *then* $x^{**} = x_2^*$

Proof of Lemma 4

The first order condition of x^{**} is

$$-\alpha \frac{\partial p(x^{**}, y_1^{**})}{\partial x} D - (1-\alpha) \frac{\partial p(x^{**}, y_2^{**})}{\partial x} D - C'(x^{**}) = 0$$

Applying the implicit function theorem, we obtain

$$\frac{\partial x^{**}}{\partial \alpha} = -\frac{-\frac{\partial p(x^{**}, y_1^{**})}{\partial x} D + \frac{\partial p(x^{**}, y_2^{**})}{\partial x} D}{-\alpha \frac{\partial^2 p(x^{**}, y_1^{**})}{\partial x^2} D - (1-\alpha) \frac{\partial^2 p(x^{**}, y_2^{**})}{\partial x^2} D - C''(x^{**})} < 0$$

This is because, $\frac{\partial^2 p(x,y)}{\partial x \partial y} > 0$ and $y_1^{**} > y_2^{**}$ implies that $\frac{\partial p(x^{**}, y_2^{**})}{\partial x} < \frac{\partial p(x^{**}, y_1^{**})}{\partial x}$.

Finally if $\alpha = 1$ the victim is type θ_1 with probability 1, and the second best solution coincides with the first best solution since there is perfect information over victim type, $x^{**} = x_1^*$. For the same token, if $\alpha = 0$ then $x^{**} = x_2^*$. ∎

Finally, given that the injurer exerts an intermediate level of precautionary effort and that the injurer and the victim precaution effort are substitutes, the less able victim increases his precaution effort while the more able victim reduces his precaution effort.

Lemma 5 $y_1^{**} < y_1^*$ *and* $y_2^{**} > y_2^*$.

Proof of Lemma 5

The first order condition of y_i^* coincides with the first order condition of y_i^{**}, and it is

$$-\frac{\partial p(x, y_i)}{\partial y} D - C'(y_i, \theta_i) = 0$$

Applying the implicit function theorem, we obtain

$$\frac{\partial y}{\partial x} = -\frac{-\frac{\partial^2 p(x,y)}{\partial x \partial y}}{-\frac{\partial^2 p(x, y_i)}{\partial y^2} D - C''(y_i, \theta_i)} > 0$$

Then, using that $x^{**} \in [x_1^*, x_2^*]$, we can conclude that $y_1^{**} < y_1^*$ and $y_2^{**} > y_2^*$. ∎

Notice that the less able victim is better off in the first best solution than in the second best solution since the injurer effort is reduced and he has to increase his care.

3 Comparing Legal Solutions

3.1 Differentiated negligence rule when the victim's type is observable

We start with the simplest case in which the injurer can observe the victim's type. In this case we will show that a differentiated negligence rule based on the victim's type can implement the first best solution. A differentiated negligence rule sets two different levels of care depending

on the victim's type. The injurer has to pay damages equal to D if an accident materializes and the precautionary effort of the injurer is lower than $\bar{x}_i$, where i is the victim's type.

Lemma 6 *If $\bar{x}_1 = x_1^*$ and $\bar{x}_2 = x_2^*$ the differentiated negligence rule implements the first best solution*

Proof of Lemma 6

We denote by x_i^{DL} the precaution effort of the injurer when he is facing a victim of type i. There are two cases

1. First, we consider that $x_i^{DL} \geq x_i^*$. In this case, the injurer is not liable and consequently he has not to compensate the victim for any harm. Therefore, the injurer will never choose a precaution effort larger than x_i^* when he observes that the type of the victim is i. If the injurer exerts a precaution effort of x_i^*, the optimal response of the victim will be $y_i^{DL} \in \arg\max\{-p(x_i^*, y_i)D - C(y_i, \theta_i)\}$. The solution of this problem coincides with the first best solution, $y_1^{DL} = y_1^*$ and $y_2^{DL} = y_2^*$.

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2. Assume now that, the injurer chooses $x_i^{DL} < x_i^*$. In this case, the victim optimal response is $y_i^{DL} = 0$ since in case of accident he will be compensated by the injurer. Then in case of $x_i^{DL} < x_i^*$, the optimal response of the injurer us $x_i^{DL} = x'$, where $x' \in \arg\max\{-p(x,0)D - C(x)\}$.

Now we show that the injurer prefer the case 1 to the case 2. This is because, the first best solution maximizes the total surplus, and with the first best the victim is worse off (he has an expected cost of $-p(x_i^*, y_i^*)D - C(y_i^*, \theta_i)$) than in the case in which $x_i^{DL} < x_i^*$ (the victim has not to bear any cost). Therefore, if the total surplus is larger in the first best solution and the surplus of the victim is lower necessarily the injurer has larger surplus with the first best solution. ∎

3.2 Uniform negligence rule when the victim's type is not observable

A uniform negligence rule set a single required level of precaution effort $\bar{x}$, under which the injurer would pay damages equal to D to the plaintiff (the victim). Now the we can not achieve the first best solution since the injurer can not observe the victim's type, but the next lemma show us that we can implement the second best solution with this simple rule.

Lemma 7 *If $\bar{x} = x^{**}$ the uniform negligence rule implements the second best solution.*

Proof of Lemma 7

We denote by x^L the precaution effort of the injurer. There two cases

1. First, we consider that $x^L \geq x^{**}$. In this case, the injurer is not liable and consequently he has not to compensate the victim for any harm. Therefore, the injurer will never choose an precaution effort larger than x^{**}. If the injurer exerts an precaution effort of x^{**}, the optimal response of the victim will be $y_i^L \in \arg\max\{-p(x^{**}, y_i)D - C(y_i, \theta_i)\}$. The solution of this problem coincides with the second best solution, $y_1^L = y_1^{**}$ and $y_2^L = y_2^{**}$.

2. Assume now that, the injurer chooses $x^L < x^{**}$. In this case, the victim optimal response is $y_i^L = 0$ since in case of accident he will be compensated by the injurer. Then in case of $x^L < x^{**}$, the optimal response of the injurer us $x^L = x'$, where $x' \in \arg\max\{-p(x,0)D - C(x)\}$.

Now we show that the injurer prefer the case 1 to the case 2. This is because, the second best solution maximizes the total surplus, and with the second best the victim is worse off (he has an expected cost of $-p(x^{**}, y_i^{**})D - C(y_i^{**}, \theta_i)$) than in the case in which $x^L < x^{**}$ (the victim has not to bear any cost). Therefore, if the total surplus is larger in the second best solution and the surplus of the victim is lower necessarily the injurer has larger surplus with the second best solution. ∎

3.3 Differentiated negligence rule when the victim's type is not observable

A differentiated negligence rule sets two required levels of precaution effort $\bar{x}_1$ and $\bar{x}_2$. Under this rule, the injurer would pay damages equal to D to the plaintiff (the victim) if the victim is of type θ_1 and $x < \bar{x}_1$ or if the victim is of type θ_2 and $x < \bar{x}_2$. The injurer, however, can only choose a single level of effort since he can not observe the victim's type. Then, the first best solution is not achievable. The next proposition characterizes the equilibrium precaution efforts when the injurer can not observe the victim's type and required precaution efforts are equals to the first best solution. We denote by x^{DLNO} the precaution effort of the injurer.

Lemma 8 *If differentiated negligence rule set $\bar{x}_1 = x_1^*$ and $\bar{x}_2 = x_2^*$. The injurer exerts an precaution effort*

$$
x^{DLNO} = \begin{cases}
x_2^* & \text{if } x'' > x_2^* \\
x_2^* & \text{if } x'' \in (x_1^*, x_2^*) \text{ and } -(1-\alpha)p(x'',0)D - C(x'') < -C(x_2^*) \\
x'' & \text{if } x'' \in (x_1^*, x_2^*) \text{ and } -(1-\alpha)p(x'',0)D - C(x'') > -C(x_2^*) \\
x_1^* & \text{if } x'' < x_1^*
\end{cases}
$$

Where $x'' \in \arg\max\{-(1-\alpha)p(x,0)D - C(x)\}$.

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Proof of Lemma 8

We first show that the injurer never chooses an precaution effort lower than x_1^*. Assume that the injurer exerts a precaution effort $x' < x_1^*$, where $x' \in \arg\max\{-p(x,0)D - C(x)\}$, but the solution of this problem has to be larger than x_1^* (since $x_1^* \in \arg\max\{-p(x,y^*)D - C(x)\}$, and y and x are substitutes). $x' > x_1^*$ implying that $-(1-\alpha)p(x,0)D - C(x)$ is increasing on x for all $x < x_1^*$. Therefore, $-(1-\alpha)p(x_1^*, y^*)D - C(x_1^*) > -p(x,0)D - C(x)$ $\forall x < x_1^*$. Then the injurer never chooses a precaution effort lower than x_1^*. If $x \geq x_2^*$ the injurer is not liable and consequently he has not to compensate the victim for any harm. Therefore, the injurer will never choose an precaution effort larger than x_2^*.

Let $x'' \in \arg\max\{-(1-\alpha)p(x,0)D - C(x)\}$, if $x'' > x_2^*$, this implies that $-(1-\alpha)p(x,0)D - C(x)$ is increasing on x for all $x \in (x_1^*, x_2^*)$. Therefore, $-C(x_2^*) > -(1-\alpha)p(x,0)D - C(x)$ $\forall x < x_2^*$. Then the injurer by choosing x_2^* avoids to pay any penalty and this is better than choosing a precaution effort lower than x_2^*, since in this case the injurer is liable if the victim is of type θ_2.

If $x'' < x_1^*$, this implies that $-(1-\alpha)p(x,0)D - C(x)$ is decreasing on x for all $x \in (x_1^*, x_2^*)$. Therefore, $-(1-\alpha)p(x_1^*,0)D - C(x_1^*) > -(1-\alpha)p(x,0)D - C(x)$ $\forall x \in (x_1^*, x_2^*)$.

If $x'' \in (x_1^*, x_2^*)$, we have to compare between the cost of exerting x_2^* and $-(1-\alpha)p(x'',0)D - C(x'')$ ∎.

Therefore, we have basically two cases

- Case 1). If $x'' > x_2^*$ or $x'' \in (x_1^*, x_2^*)$ and $-(1-\alpha)p(x'',0)D - C(x'') < -C(x_2^*)$, the injurer chooses x_2^* and does not pay any damages in case of accident. Given that, the victims choose $y_i^{DLNO} \in \arg\max\{-p(x_2^*, y_i)D - C(y_i, \theta_i)\}$. Then the type θ_2 chooses the first best level of precaution effort, and the type θ_1 chooses a precaution effort lower than the first best solution $y_1^{DLNO} < y_1^*$.

- Case 2). If $x'' < x_1^*$ the injurer chooses an precaution effort equal to x_1^* and if $x'' \in (x_1^*, x_2^*)$ and $-(1-\alpha)p(x'',0)D - C(x'') < C(x_2^*)$ the injurer chooses a precaution effort equal to x''. In this case the injurer is liable if the victim is of type θ_2 and

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he has to pay the damages in case of accident. Then the victim of type θ_2 exerts a precaution effort equal to 0. Finally, if the victim is of type θ_1 the injurer is not liable and the victim has to bear the cost of the accident. Then his precaution effort level there will be $y_1^{DLNO} \in \arg\max\{-p(x_i^{DLNO}, y_1)D - C(y_1, \theta_i)\}$ which will be lower or equal to the first level solution.

We have to notice the case 1 (case 2) is more likely for low (high) values of α.

4   IMPLICATIONS OF THE MODEL AND THE APPLICATION OF THE NEGLIGENCE RULE

It is a general feature of most, if not all, legal systems, that some easily identifiable cathegories of persons are subject to less stringent standards of due care than the average person. Probably the clearest example of this differentiated treatment is given by the levels of care required of children. Given their lower psychological disposition and ability to take care, in order to comply with the requirements of the negligence rule, children don't need to adopt the precautions that the average citizen would take, but just those of ordinary kids of their age and experience. As the English case Gough v. Thorne[3] expressed:

The standard is that of "*any ordinary child of 13 $\frac{1}{2}$, by which I do not mean a paragon of prudence, nor do I mean a scatter-brained child, but the ordinary girl of 13 $\frac{1}{2}$*"

This attitude towards the definition of due care concerning minors is prevalent in Continental European legal systems (Von Bar (1998), p. 98) and also in the English and Nordic legal systems (Von Bar (1998), p. 343). In the US legal system, the Restatement of the Law Third, Torts: General Principles, provides as a general rule for children in § 8:

"*When the actor is a child, the actor's conduct is negligent if it does not conform to that of a reasonably careful person of the same age, intelligence and experience...*"

In the Spanish legal system, also, the Supreme Court has consistently (or almost) denied that naughty, irreflexive, careless actions by children constitute negligent behavior that might be considered under contributory or comparative negligence rules. It is true, though,

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[3][1966] 3 All ER 398[1966] 1 WLR.

that some cases of reckless disregard of danger, let alone criminal conduct, by minors, have led to reductions or outright denial of liability due to contributory or comparative negligence: Ferrer and Ruisánchez (1999).

When, as it is usually the case, children (or other types of victim with higher cost of care) are the victims in the accident, how this affects the required levels of care of injurers involved?

4.1 Simultaneous accidents where victim's type is observable

In section 3 we showed that when the type of victim is observable by the injurer, the first-best is implementable through a rule that imposes upon the injurer differentiated levels of due care depending on the type of victim: a higher level of care when encountering victims with higher costs of care, and a lower one when facing a victim belonging to the group having lower costs of care.

This kind of implementation mechanism is precisely what one observes in real-world legal systems through the use of the negligence rule. The negligence rule discriminates standards of care on the injurer's side, on the basis of the type of victim, when the former is in the position to know the type of victim when deciding about the level of care.

Thus, for injurers dealing ordinarily with less able types of victims (children, physically or mentally handicapped persons) the standard of care is substantially higher than the one applied to injurers engaging in the same kind of activity, but ordinarily not interacting with those groups of victims. Just to give an example: the Spanish Civil Code and the Spanish Supreme Court apply very different standards of care to educators dealing with minors (in primary or secondary institutions) than to University professors, who usually encounter young adults, but not children, in the course of their educational activities [Ferrer and Ruisánchez (1999), Durany (1999)].

Even when the interaction with the type of victim having higher costs of care is uncommon, or merely casual, most legal systems still provide for enhanced duties of care

correlated to the type of victim encountered, when the injurer observed, or could have observed, the victim's type. The injurer has to take additional precautions to counteract the lower level of care expected from that particular type of victim, and failure to do so would involve negligence and the corresponding liability for the harm caused to the less able victim [Seidelson (1981), Prosser and Keeton (1984), Von Bar (1998)]. When children, for instance, are in the vicinity, their sometimes impulsive and thoughtless behavior has to be anticipated by the potential injurer, and thus, enhanced vigilance and caution is required to escape liability, enhanced care that would not be looked for in the presence of an adult as victim.

This attitude is again consistent with the attainment of first-best efficiency in a world of observable victim's type. The fact that the injurer does not commonly encounter that particular type of victim, and that she is used to deal with other types of victim does not make the adoption by the negligence rule of a special and increased standard of care in these circumstances less attractive on efficiency grounds.

4.2   Simultaneous accidents where victim's type is not observable

Things are more complicated, also in legal terms, when the victim's type is not readily observable by the injurer.

It is undisputable that the presence in the population of potential victims of some people having higher costs of care drives up the optimal level of care with respect to the level of care that would have been optimal in face of a homogeneous pool of victims. Most legal systems seem sensitive to changes in the likely composition of the pool of potential victims, and, at least partially, along the lines that the model presented in section 2 shows to be consistent with the pursuit of second-best efficiency. For instance, the increased probability of the presence or proximity of children seems to push up the standard of care necessary to avoid being held negligent. Drivers are usually informed by adequate warnings that they approach a school area and thus, that the pool of pedestrians who might suffer an accident

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contains a higher fraction of children than the average neighborhood of the city. All legal systems require extra care from drivers entering an area covered by such a warning. In our model, it is efficient to increase the required level of precautions when $1 - \alpha$ (the fraction of high-cost victims in the population of potential victims) increases.

Similarly, when $1 - \alpha$ a goes down in a certain setting, so does the optimal level of care on the part of the potential injurer, and so should the due care standard. For instance, when the pool of potential victims is less likely to contain children or other groups of high-cost victims, the desirable level of care of those carrying on the eventually harmful activity decreases. This finding seems to give theoretical support to the adult-activity doctrine in Tort Law [4]. This doctrine operates as an exception to the general rule that children are subject to a different and less stringent standard of care than adults. If children engage in so-called adult activities, they are held to the adult standard of behavior. In those activities in which typically one does not encounter children (say, driving, or motor-boat racing), potential injurers expect $1 - \alpha$ to be zero, and therefore, that all potential victims are low-cost ones. An increase in the injurer's required level of precaution makes no sense here.

It is clear, moreover, that activities in which the participation of the high-cost victims is legally prohibited (like driving for small children or blind persons) due to the overall dangerousness of its consequences when executed with little care, are obvious candidates for the application of this doctrine [5].

Even without specific signals, it seems that the likely increased presence of potential victims with higher costs of care suffices to justify the adoption of more stringent standards of due care for potential injurers [Prosser and Keeton (1984), p.200]. Some commentators defend the decision to impose this extra burden of precaution on potential injurers on fairness grounds: those who face higher costs of care have the right to engage in activities

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[4]For a discussion of this doctrine and the boundaries of the adult-activity notion, see Prosser and Keeton (1984), and Dobbs (2000).

[5]Some commentators argue for a broader use of the adult standard for children, restricting the more lenient one for those carefree activities necessary for children socialization and development [Forell (1985)].

that allow them to lead independent and enjoyable lives. In the case of children, they have the right to explore the world and develop as human beings through socialization, through the habitual interaction with fellow children, adults, and the rest of the outside world in a substantially unrestrained and spontaneous manner. At least for certain activities, this right of self-sufficiency, or of self-development, justifies the extra cost of care that they imply for potential injurers through the increased levels of care under the negligence rule: Keating (2002), Ferrer and Ruisánchez (1999).

It is less clear, though, that the use of more strigent levels of care before populations of victims with a higher fraction of less able people is totally consistent with our characterization of second-bet efficiency. The implementation of second-best in our model would, in its simplest form, require a rule mandating in every case a standard of care that is intermediate between the first-best optimal towards victims with low costs of care and the first-best optimal towards high-care victims. It is extremely doubtful that this is really what Courts do in most cases, given that there is little evidence that the likely presence of children effectively elevates the standard of care in the cases in which the actual victim was a low-cost victim (an adult), and not a high-cost one. Moreover, the direct implementation of the second-best would imply that high-cost victims would be induced to adopt a higher level of care than their first-best optimal, given that the injurer is complying with the intermediate and required level of care as injurer. Nothing of this kind appears mentioned in the literature, nor the cases, when dealing with contributory and comparative negligence, contemplate any increase in the levels of care of less able victims in a bilateral accident with unobservable victim's type[6] .

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[6]In the simple world of our model, liability rules were implicitly assumed to operate perfectly, and thus, the negligence rule, unaccompanied by contributory or comparative negligence, was able, on its own, to do the trick of inducing the efficient levels of care both for the injurer and the victim. S the direct implementation of the second-best in this setting dos not require paying attention to the levels of care of the victim. The reality that in the actual cases, though, there are no traces of the increased level of care of the high-cost victims, may be interpreted as indirect evidence of the fact that Courts are not trying to use a negligence rule that mimicks the direct implementation of the second-best.

Some commentators, moreover, appear to criticize the amalgamation of adults and children to determine a kind of average level of care (even if, as here is the case, to indirectly fix the level of care of a potential injurer facing both types of victim): Landes and Posner (1987).

In some areas of the Law, anyway, it seems that the attainment of the second-best is far from being the motivation behind the rules implemented by the Courts. It is clear that the rule that is being used by Courts in various legal system resembles what we had called in section 3 the differentiated negligence rule based on the victim's type. When the person harmed by the defendant in a given case is a high-cost victim, the level of care required from the injurer under the negligence rule is the high level that was optimal for that type of victim (but not for the pool of high- and low-cost victims), whereas wen the plaintiff is a low-cost victim, the standard of care that the negligence rule would impose on the injurer is the low level that was optimal for that type of victim, but no for the pool.

This attitude is particularly noticeable in the field of tort liability of owners or occupiers of land. The traditional Common Law rule is that landowners owe no duty of reasonable care to trespassers, and thus, if a trespasser suffers harm as a result of the trespass, the owner or possessor will not be liable. The level of care of the landowner towards the so-to-speak "low-cost trespasser" is low (in fact, at least in principle, zero). The legal situation differs widely when the trespasser is a child. In this case, when the landowner knew or had reason to know that child trespassers were likely, the landowner owes a duty of care to the child trespasser. That is, when the potential injurer knew or could have known about the non-insignificant presence high-cost victims among the population of potential trespassers, the standard of care towards them is high (positive, instead of zero. A complete account of the American cases can be found in Prosser and Keeton (1984), p. 393, and Dobbs (2000), p. 592. Curiously enough, under Spanish Law, the rule, although less clearly stated, is very similar. The Spanish Supreme Court, in several rulings, has determined that the owners of abandoned dangerous premises (usually, mines or industrial sites) are required to adopt adequate measures that would avoid harm to inexperienced or irreflexive persons (read:

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children), and would be liable in tort if failing to do so [Ferrer and Ruisánchez (1999)]. Comparable cases involving adult intruders in the premises would receive a substantially different solution.

Notice that in these cases, in order to impose upon the injurer the increased duty of care in front of the less able victims, Courts do not require observability of the victim's type (in most cases the landowner is unaware of the trespassing), simply that the potential injurer knows, or has reasons to know, that there are high-cost victims. In other words, Courts diversify the level of due care on the basis of the victim's type despite its unobservability.

In section 2 we have already showed how this rule is less desirable on efficiency grounds than a rule that simply and directly implements the second-best with a uniform level of due care for the injurer equal to the second-best optimal. There might be other factors alien to efficiency that might justify the use of the differentiated standard of care. If the goal of the legal system is to satisfy some kind of Rawlsian preference in favor of the welfare of the less well-off (here, by hypothesis, the group of victims with high costs of care), a differentiated standard for the injurer based on the type of victim actually encountered might, under the conditions referred to in cases 1) and 2) of proof of Lemma 8 above, constitute an attractive policy alternative.

The use by Courts of a uniform negligence rule irrespective of the type of the actual victim encountered by the plaintiff in the tort suit might be considered by many as unfair. One could consider that the uniform rule provides injurers and victims with lower costs of care with the opportunity of free-riding on the higher costs of care of other groups of potential victims. The presence of the latter groups allows the more able ones to save costs of care because they can anticipate that the potential injurer would adopt hundred percent of the times (remember, type is unobservable for the injurer) more precautions under the uniform rule, precisely due to the fact that there are less able victims in the pool. Injurers, on their part, incur costs of care with respect to all types of victims lower than the first-best optimal ones with respect to the group of victims with higher costs of care. Moreover, the uniform negligence rule forces the latter group of potential victims to increase their levels

of precaution, in anticipation of the lower care that potential injurers will adopt in front of the whole population of victims.

Specially if one considers the typical groups with recognizably higher costs of care (children, mentally or physically impaired persons), to many people, including many Courts, these effects might strike them as unfair. And some might even advocate that the welfare of these groups that specially deserve protection by society and by the legal system is well worth the price of some inefficiency in the functioning of tort Law.

In case 1) of the proof of Lemma 8 above, given that injurers choose the level of care that is first-best with respect to the high-cost victims, and these, accordingly, opt also for their first-best level of precaution, the level of welfare of the less able victims under the differentiated negligence rule is higher than under the uniform rule directly implementing the first-best.

When the condition described in case 2 of the proof of Lemma 8 holds, the injurer neglects, in order to choose the level of care, the presence of the high-cost victims, and opts for the level of precaution that corresponds to the low-cost victims alone. Therefore, injurers are always found negligent when the victim is high-cost, and thus, the latter will be induced to incur no costs of care, given that they will always be compensated [7]. If (a big if, though) damages paid by the injurer always cover the harm suffered by the victim, the welfare of high-cost victims (though not social welfare) is maximized with the use of the differentiated negligence rule: they have zero costs of care and they are indifferent, because of the damage payment, between the occurrence and not occurrence of an accident. Moreover, if the second-best level of care of potential victims was anyway close to zero (which seems plausible for certain accidents settings given the cost functions of at least some groups of less able victims), the inefficiency arising from the differentiated rule is relatively small, and might, at least by some, be considered an affordable price to pay in order to maximize the welfare of children or other disadvantaged groups of potential victims.

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[7] Remember the remarks made in note 5 above.

Consequently, then, the use of a differentiated negligence rule based on the victim's type, although less than optimal in terms of the attaintment of second-best efficiency, appears to improve in all cases the lot of the high-cost victims compared with the uniform rule immediately implementing the second-best optimum. We don't have enough evidence about the motivations of Courts to use the differentiated rule in various accident settings, allowing us to advance this result as the most convincing theory behind this behavior on the part of Courts. But we believe it to be a plausible explanation of the fact that legal systems and Courts sometimes prefer the differentiated rule over the more efficient uniform rule.

5 EXTENSIONS AND CONCLUSIONS

That potential accident victims are heterogeneous in terms of their costs of care is a fact of life. Some victims face higher costs of taking care than others. In the paper we have explored the implications of this heterogeneity for the functioning of the negligence rule.

In our approach we have opted for a model of two types of victim, differing in their costs of care. The extension of the model to a larger number of types would be trivial. We have decided not to extend the model with continuous types of victims, mainly for two reasons. First, it would essentially replicate the findings and implications of the discrete two-types model. Second, from a Law and Economics perspective, a continuous type setting would not adequately capture the actual perspective of the legal system, in which no consideration is given to each individual standard of care, but instead, broad (extremely broad, one could say, or even just one) cathegories are built in order to define levels or standards of due care. In the Law, standards of care are always general and average, and not made-to-measure. Information costs would be otherwise intractable [Landes and Posner (1987)].

Our model is also built upon the assumption that there is substitutability between care by victims and injurers. This is the standard assumption in the Law and Economics literature on bilateral accidents. It could be possible to extend our model to the case of

complementary between the corresponding care efforts of injurers and victims. The basic results of our model would then be reversed, because it would be optimal for injurers to exercise more care with respect to low-cost than with respect to high-cost victims. We believe, though, that the complementary case is of very little relevance for the operation of liability rules.

To summarize the main results of our paper: we characterize first-best efficient levels of care for the injurer and both types of victims. We also characterize the second-best levels of care, which cannot be improved when injurers cannot observe the victim's type when deciding about the level of precaution the will adopt.

Turning to the effects of the negligence rule on the adoption of care, we consider a uniform and a differentiated (based on the actual victim's cost of care) negligence rules, both of which seem to be in use in different legal systems. When the injurer can observe the victim's type, first-best results can be achieved using the differentiated rule. When this is not the case, a uniform negligence rule with due care set at the second-best optimal care for the injurer implements the second-best. The differentiated rule cannot do the trick, and is thus less efficient than the uniform rule in an unobservable victim's type situation.

We discuss the actual use of several rules and doctrines in various legal systems, employing the results of the model as our theoretical framework. Specifically, we discuss how the departure from efficiency through the use of the differentiated rule in situations of unobservable type might respond to a preference for the welfare of high-cost victims at the expense of second-best efficiency.

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