ON THE INTRINSIC SUPERIORITY OF REGULATION AND INSURANCE OVER TORT LAW

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ABSTRACT

In this article we argue that regulation is intrinsically superior to tort liability because the mix of probability and magnitude of the sanction can be freely set at the optimal level, while tort law relies on a mix set by nature, as the probability of the liability sanction equal in general the probability that an accident occurs, and the magnitude of the sanction corresponds to the magnitude of the harm. Furthermore, we analyze the role of insurance as the only way to remove the incentives created by tort law and substitute them with regulatory incentives.

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1   Introduction

The issue of 'regulation versus tort law' has received great attention in the law and economic literature without yielding any definitive judgment on the superiority of either one.[1] Considerably lesser consideration has been bestowed to the issue of 'regulation plus tort law', but also in this case the research has conveyed that in some instances the implementation of them both yields a more desirable outcome than their isolated use.[2] The point that we will make and elaborate upon in this paper is instead that regulation is intrinsically superior to tort law as a mechanism to provide parties with incentives to take precaution.

Both tort law and regulation generate incentives to take precaution by means of a certain combination of magnitude S and probability p of sanctions. Under tort law, the magnitude of the sanction S_t corresponds to the harm to be compensated (say €1000) and the probability p_t is equal to the probability that an accident occurs (say 5%). The resulting expected sanction is $s=p_t S_t$, (1000· 5%=50, in the example). Albeit this expected sanction may in general create the correct incentives to take precaution, the same expected sanction can be generated by an infinite number of different combinations of probability and magnitude (e.g. 50· 100%=50, 100· 50%=50, 500· 10%=50, 2000· 2.5%=50, 10,000· 0.5%=50, and so forth). The literature on law enforcement has pointed out that there are several factors bearing on the optimal choice of the mix between probability and magnitude of a sanction given the need of producing certain incentives.[3] We maintain that regulation is superior because, while under tort law the mix is set by nature and can hardly be influenced, regulators are free to set probability and magnitude according to the most efficient combination.

After establishing this result and analyzing the factors bearing on the optimal choice of probability and magnitude of a sanction, we will show that if tort law is to be removed and substituted with regulation, mandatory insurance ought to be implemented. In fact, no liability is a liability rule in an economic sense and does not correspond to removal of tort law as the

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[1] For the first approaches to the alternative choice between regulation and tort law see Wittman (1977) and Shavell (1984a).

[2] See Shavell (1984b), who first analyzed the combined use of regulation and tort law. The sole other analyses on the topic are Kolstad, Ulen and Johnson (1990), Burrows (1999). These studies emphasize that neither tort law nor regulation would yield to a first best equilibrium level of precaution is employed alone; their combined use does not yield a first best either but improves the second best outcome. See also Schmitz (2000) for a critical analysis of previous results in the literature. De Geest and Dari Mattiacci (2002) show instead that, in some circumstances, regulation can actually remove completely the judgment proof problem that undermines the incentives created by tort law and enable the latter to yield a first best outcome.

[3] See Polinsky and Shavell (2000a and 2000b).

accident loss is simply allocated to the victim. In general, any liability rule simply allocates or shares the loss among the parties. In order to remove the sanction system generated by tort law, both parties to an accident ought to be delivered from the accident loss. Insurance bears this task. In our view, what has been always seen as a deficiency of insurance – the dilution of incentives created by tort law – becomes its strength.

In the next several sections, we will elaborate upon these two main points and study the reciprocal relationships between regulation and insurance, on the one hand, and insurance and tort law, on the other. We will show that if law enforcement through regulation requires insurance to remove tort law, insurance cannot function as a general delegated control system in the absence of regulation, for economies of scale, public-good problems and perverse incentives for the insurance industry to collude. Moreover, insurance eradicates tort liability from the parties' interaction, but liability rules (including no liability) remain an irremovable device to split costs among insurers. In this sense residual tort law should be set in such a way to minimize the administrative costs the insurance system. We will then study the financing of the insurance system as a way to control parties' activity level, which is closely related to corrective taxation.

In the last part of the paper, we will address issues concerning the administrative costs and the information requirements of the regulation and tort system and derive the conditions under which these costs make the implementation of the regulation-plus-insurance model unfeasible, leaving room for tort law or tort law and regulation combined.

This paper is organized as follows. Section 2 analyzes the factors bearing on the optimal choice of magnitude and probability of sanctions and shows the superiority of regulation over tort law. Section 3 elucidates the role of mandatory insurance as a way to remove tort liability. Section 4 examines the role of insurance as delegated control mechanism and compares insurance and regulation as two potentially competing systems to provide incentives to take precaution. Section 5 discusses the residual role of tort liability in lowering the administrative costs of the insurance system, once its incentive effects are removed. Section 6 is devoted to the study of the financing of the insurance coverage as a way to control parties' activity level, and of ex post sanctions. Section 7 compares the administrative costs of a system only based on regulation and mandatory insurance with a system of tort liability and their ability to remove risk and provide compensation to injured victims. Section 8 concludes.

2   The superiority of regulation over tort law

By tort law we mean the functioning of the system under which victims can claim compensation from injurers through the judiciary, according to certain liability rules. By regulation we mean those situations in which a (administrative or criminal, monetary or non-monetary) sanction is levied upon a certain behavior by an enforcer (the police, a governmental agency, or a criminal court). Regulation is intrinsically superior to tort liability as a device to generate incentives to take precaution; while under tort liability the probability and the magnitude of the sanction are blindly set by nature and correspond to the probability of an accident and the magnitude of the harm, respectively, regulators may attain the same expected sanction $s=pS$ by means of a virtually infinite number of combinations of p and S. This flexibility allows regulation to respond to factors that would impair the effectiveness of the incentives produced by tort law. We do not claim that tort law is completely irresponsive to these aspects, but its receptivity is clearly limited to the setting of S, while p does not directly depend on public policy. Let us further elaborate on this point.

Under tort law, the magnitude of the sanction correlates with the magnitude of the harm. Notwithstanding, legal systems make at times an attempt to reset it. Punitive damages,[4] undercompensation[5] and average or inaccurate[6] compensation of the harm are examples of instances in which the natural setting of the magnitude of the sanction is overturned by legal dictates or judicial precedents. Nevertheless, the attainability of different levels of p from the level set by nature is very limited, as p basically depends on two factors that are not in the direct control of the policy maker: the possibility for the injurer to escape detection, which mainly rests on the nature of the externality or on the context in which the externality takes place, and the willingness of victims to sue, that in turn mainly depends on the cost of litigation,

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[4] Punitive damages are broadly used in the United States while they are an unfeasible solution in most other legal systems. Judges usually award punitive damages when the injurer has acted in a willful, wanton or malicious manner. In the economic literature, they are usually interpreted as a way to compensate apprehension rates lower than 100%, e.g. $a=25\%=1/4$, by multiplying the damage award by an appropriate factor, e.g. $1/a=4$, in order to make the injurer bear the full expected accident loss. See Cooter (1982) and Polinsky and Shavell (1998). See Polinsky and Shavell (2000c) for an integrated treatment. Boyd and Ingberman (1994) study the effect of punitive damages on the equilibrium level of precaution when injurers are insolvent. Dari Mattiacci and De Geest (2001) argue instead that average compensation is always superior to punitive damages. Boyd and Ingberman (1999) show that punitive damages may provide injurers with incentives to reduce their exposure to liability by hiding or transferring their assets.

[5] See Boyd and Ingberman (1994) and Dari Mattiacci and De Geest (2001) on this point.

[6] Dari Mattiacci and De Geest (2001) study the effect of average compensation as opposed to punitive damages when injurers are potentially insolvent. Kaplow (1994) and Kaplow and Shavell (1996) analyze the issue of accurate compensation of victims' losses and discuss the desirability of investing resources in accurate damage awards.

the probability of success and the measure of the compensation.[7] The cost of litigation may be determined at a policy level, and hence influence p, but the determination of the measure of the compensation will affect at the same time p and S, potentially yielding undesired outcomes. Moreover, even if p may be reduced, it is hard to imagine how p could be possibly increased over the level at which injurers pay compensation for all accidents they cause. The steadiness of p undermines the effects on the setting of S, as it ties any change in S with a correspondent change in the expected sanction s, which may in turn be undesirable in the specific circumstances. Consequently, tort law appears seriously constrained in the setting of p and S.

Regulation may instead rely on a rather uncontrived set of possibilities to determine p and S independently. The probability of the sanction depends in fact on the level of enforcement and can be pushed either beyond or below the probability of causing an accident, as police control may regard parties' levels of ex ante precaution directly, rather than being activated by the actual occurrence of an accident. Tort law, in fact, only sanctions inattentive motorists if an accident occurs, while police controlling speed limits sanction motorists in any case their speed was excessive, before and irrespective of the occurrence of accidents. Regulation may therefore set p at virtually any level between 0 (no police on the street) and 1 (an electronic speed control device on every street), while tort law may in the best scenario only set p between 0 and p_t, the probability that an accident occurs, which is in general lower than 1.

Concerning the sanction, not only does a regulatory approach allow for the determination of the magnitude independently of the probability, but it also caters for the need to substitute at times a monetary sanction with a non-monetary one, a choice that is generally not available under tort liability. Moreover, the implementation of sanctions through the regulatory system makes the sanction only related to the production of incentives and tailored on the violators' behavior only, while the compensation of victims is left to the insurance system that we will analyze in a next section. Tort law inevitably groups these two functions together with unavoidable conflicting tendencies.[8] Furthermore, the regulatory approach allows to deal with the risk attitude of parties in a more specific way, as violator are considered while setting the probability and the magnitude of sanctions, while victims while setting the modality of harm

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[7] See Summers (1983) and Shavell (1986) on the effects of the victims' propensity to sue on the injurers' levels of precaution. See also Polinsky and Che (1991) on the effects of the magnitude of the damage award on the injurers' levels of precaution and the victims' propensity to sue.

[8] See Calabresi (1970) for the first systematic analysis of the functions of tort liability and their reciprocal compatibility from an economic perspective. Calabresi emphasizes three functions for the law of torts: incentivizing parties to take precaution, allocating the risk of accidents, and minimizing the administrative costs of

compensation. Again tort law only provides for the allocation of risk to a party or another, while the curbing of risk generally dilutes incentives.[9]

2.1 Factors bearing on the setting of *p* and *S*

The next several subsections will provide with an analysis of the factors bearing on the optimal setting of *p* and *S* and for their mutual interaction under a regulatory approach.

2.1.1 Enforcement costs

The setting of *p* triggers enforcement effort in terms of controlling and monitoring the parties' behavior either directly (ex ante control, e.g. speed limits) or indirectly by means of subordinating the application of a sanction to the actual occurrence of accidents (ex post control, e.g. criminal sanctions for personal injuries caused by reckless driving). The literature has long been remarking[10] that enforcement costs may be reduced by lowering *p* and increasing *S*.

2.1.2 Sanctioning costs

The implementation of sanctions is not costless either. Monetary sanctions must be collected (e.g. fines) and non-monetary sanctions must be imposed (e.g. temporary suspension of the driving license) and might generate the need of further enforcement (e.g. police must control whether drivers whose driving licenses were suspended are actually driving) or litigation. Some non-monetary sanctions, like imprisonment, trigger direct costs in their implementation. These costs may be curbed by increasing the magnitude of *S* and reducing *p*, henceforth reducing the number of cases in which the sanction is applied. When the sanctioning costs depend directly on the magnitude of the sanction, as for imprisonment, the reduction therein due to fewer cases may be counterbalanced by an increase in the cost per case due to higher sanctions.

2.1.3 Risk aversion

The bearing of risk by risk-averse individuals produces an individual loss that straightforwardly corresponds to a social loss. Curbing this loss enhances social welfare. Increasing *p* and

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the system.

[9] See Calabresi (1970). See also Shavell (1987) and Landes and Posner (1987).

[10] Becker (1968) first proposed an economic approach to law enforcement and emphasized the effect of *p* and *S* on incentives and enforcement costs. See also Polinsky and Shavell (2000a and 2000b) for a comprehensive treatment.

reducing S lowers risk and contains the negative effects that risk has on social welfare.[11]

2.1.4   Maximum feasible probability

Some violations are easy to detect, while other require costly investigations and complex inquiries. In some case it will therefore be impossible or unfeasible to increase the probability over a certain threshold, rendering it necessary to work with higher sanctions.

2.1.5   Maximum feasible sanction

The magnitude of the sanction cannot in most of the cases be infinitely increased. Criminal non-monetary sanctions encounter maximum limits in most legal systems, and monetary sanctions are generally limited by the wealth of the violator, a problem known as judgment-proofness.[12] Social and moral constraints may further furnish with criteria to restrain the setting of S. Higher level of p might be thus desirable.

2.1.6   General versus specific enforcement

So far we have been implicitly discussing the setting of p and S per violation to be prevented. In the most abstract case, p and S could be set individually per violator for each type of violation. In reality, enforcers control simultaneously for several types of violations and multiple violators. A police officer along a street, for instance, will notice both violation to speed limits and the use of lights and will both monitor motorists and bicyclists.[13] In similar cases, the setting of p and S for a class of violations and a group of violators rather than individually for each of them will allow a relevant cost saving, at the price of sub-optimal setting in some individual instances.

3   Insurance as a way to remove tort liability

If control over people's production of negative externalities is to be passed from tort law to regulation in order to readjust p and S at different levels from those set by nature, tort liability

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[11] See Shavell (1987) at 186 ff. for a discussion of risk aversion in connection with liability rules and insurance.

[12] The first analyses were in Summers (1983) and Shavell (1986). See also Dari Mattiacci and De Geest (2001). The former studies focus on the level of precaution taken by injurers with limited wealth, whose precaution expenditure is assumed not to affect their wealth: the general conclusion is that judgment proof injurers may take less than optimal precaution. Beard (1990) and Dari Mattiacci and De Geest (2002) study the case in which injurers' precaution expenditures actually reduce injurers' wealth and show that judgment proof injurers may in fact find it advantageous to take more than optimal precaution.

[13] Shavell (1991) and Mookherjee and Png (1992).

must be removed. From a legal perspective the removal of tort law corresponds to the absence of liability. However, as the function of tort law is to determine which party should bear the accident loss, no liability simply means that the loss will be borne by the victim. In an economic perspective no liability is a liability rule along strict liability, simple negligence, comparative negligence and so forth. The only difference is in the party that bears the accident loss.[14] Moreover, tort liability does not remove the loss from the victim, but it simply reallocates it, if this is the case, to the injurer.

In order to remove completely the incentives produced by tort law and clear the field for the functioning of regulation, the accident loss should be eradicate, in the sense that neither the victim nor the injurer should bear it. Mandatory insurance is the solution, as it may provide compensation to the victim – thus removing the loss from him – without charging it onto the injurer. Insurance works under any liability arrangements, as it can be always designed to cover the liability or the accident loss borne by the liable party, being that party either the injurer or the victim.

By mandatory insurance we mean a (publicly or privately organized) system that provides compensation to the victim in the case of an accident, so that neither party has to pay for it. The fact that either party might be required to pay for the insurance coverage does not affect the incentives as the choice of the level of precaution usually intervenes after the insurance premium has been paid. Nevertheless, the financing of the insurance coverage will be considered in the proceeding in two respects: the control of parties' activity level and the function of insurance as delegated control system potentially competing with regulation. In the latter perspective we will account for the molding of the premium to the behavior of the insured and the direct monitoring of the behavior itself. Insurance ought to be mandatory for at least two reasons: adverse selection[15] might impair the functioning of insurance and private incentives not to buy an insurance coverage might yield the same result.[16]

4   Regulation as a way to enable the functioning of insurance

Mandatory insurance can be regarded as a delegated control system[17] inasmuch as the insurer

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[14] See Landes and Posner (1987) on this point.

[15] Akerlof (1970), Rothschild and Stiglitz (1976) and Gravelle (1991). See Chandler (2000) for a discussion of different approaches to the problem of discriminating among insured with different risks in order to limit the effects of adverse selection. See Skogh (2000) on mandatory insurance.

[16] See Calabresi (1970) at 58 and Shavell (1987) at 240. See also Dari Mattiacci and Parisi (2002) on the divergence between private and social incentives to buy insurance coverage in the presence of judgment proofness.

[17] Dari Mattiacci and Parisi (2002).

is able to influence the insured's behavior through adjusting the premium to past behavior or directly monitoring it. The question is whether the insurance is able to organize a system of control for insured's behavior and interested in doing so; insurers could act as enforcers and hence render regulation superfluous. Put metaphorically, police officers might be paid by the insurance companies rather than by taxpayers. In a competitive insurance market, there exist incentives for individual insurance companies to set up efficient systems of control so to improve the insured's behavior and reduce the price of the coverage.

Controlling people's behavior shows at times economies of scale (one unique electronic speed-control device that monitors all motorists cost less then as many devices as many insurance companies each of which only monitors the motorists insured with a specific company) and public good problems (a police officer hired by company A might serve as a deterrent for the motorists insured with company B and C, from which it would be difficult to collect). For the former two reason is seems in general more desirable to have a unique and centralized system of control, although the question remains of whether such system should be paid by the insurance industry or by the tax payers.

It seems that the insurance industry as a whole would not have sufficient incentives to set up and manage such system, even after leaving aside collective action problems that might impair the grouping of the interests of different individual companies. In fact, both the cost of administering the control system and the cost of not having the system at all (in terms of greater accident losses) would be ultimately paid by the insured, in terms of higher premiums. We shall conclude, thus, that a centrally and publicly organized control system is necessary in order to provide incentives to take precaution in the first place and lower the cost of the insurance system as a consequence. We shall account in a next section for the role of some residual incentives that may be produced by individual insurance companies by means of *bonus-malus* or similar clauses and their interaction with regulatory incentives.

5   Tort liability as a way to lower the administrative costs of insurance

We have said that insurance removes tort liability and frees parties from the incentive effects thereof. However, tort liability remains inevitably in place as a rule that allocates the accident loss among insurance companies. Again we must emphasize that no liability simply allocates the loss either to the insurer or to the victim. What should then be the criterion for the setting of liability if incentives are no longer a concern for this area of the law? Our contention is that liability rules should be designed in order to reduce the administrative costs of the insurance

system, as they are irrelevant for the parties' behavior in the presence of full insurance coverage.

It has been observed that the insurance system is a much cheaper system than the liability system as a way to provide injured parties with compensation.[18] The designing of tort liability might reduce even further such costs by catering for simple and easily applicable rules, avoiding the implementation of complex negligence inquiry and curbing litigation by enhancing certainty and foreseeability of the rules.

6   Financing the insurance coverage and exposing insured to risk as ways to control the activity level

In the economic literature on tort law, the efficiency of different liability rules is commonly discussed in relation to two elements: the level of care and the level of activity.[19] Activity level and care are different forms of precaution and the split between the two resides in the judicial inquiry over parties' negligence.[20] The precautionary measures that are investigated while deciding issues of negligence are to be considered as care. In car accidents for example, speed, condition of the brakes and stopping at the zebra crossing are likely to be considered by the judge while deciding whether or not the motorist is to be considered at fault. However, not all precautionary measures are included into the negligence inquiry, as some of them are extremely difficult or costly to measure. The determination of negligence is for example likely not to be a question of whether or not a motorist used correctly the rear mirror, or of whether or not it would have been more desirable to leave the car at home and use public transportation (an extreme form of precaution, after all).

Likewise, regulation cannot in general target all the parties' precautionary measures and some of them will escape enforcement. Also with respect to regulation, therefore, we can speak about a set of precautionary measure that will remain untaken and that we can denominate as activity level, for homogeneity with the results attained in tort law and economics. The problem of how and to what extent incentives should be provided with respect to the activity level will be discussed here. We wish to emphasize two points.

First of all, the economic theory of torts has found that, under normal tort liability, incentives to reduce the expected accident loss by adjusting the activity level are produced by

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[18] Shavell (1987) at 263.

[19] See Shavell (1987) at 5, Landes and Posner (1987) at 61, Miceli (1997) at 27, Cooter and Ulen (2000) at 311.

[20] See Shavell (1987) at 9 and 17 and Dari Mattiacci (2002).

the bearing of the residual loss, which is the accident loss that anyway occurs albeit the parties were non-negligent. The party that bears the residual loss has incentives to curb the level of his activity and in general to take precautionary measures that escape the negligence inquiry.[21] Likewise, under regulation, parties have incentives to take precautionary measures that escape apprehension if they bear some costs in the event of an accident.

This result suggests two possible solutions. A sanction could be imposed upon occurrence of an accident irrespective of whether parties have previously complied with the regulatory requirements. The sanction could be actually imposed through the insurance system by means of an increase in future premiums. In this respect, insurance companies might enjoy lower costs than a centralized regulatory system, as apprehension would be granted by the fact that the insurance is called upon while compensating the victim and hence the increase in the premium of the insured will be attained at very low administrative costs, presumably lower than the cost for the enforcer to do the same. A straightforward way to do so might be the commonly used *bonus-malus* clause. In this respect, competitive forces will drive insurance companies to set ex post sanctions efficiently, as to attract consumers. It is also sensible to believe that a graduation of the ex post sanction according to the causal contribution to the accident will yield positive results in terms of accident prevention and, hence, cost of the insurance coverage. In the economic literature on tort law, the importance of a correct determination of the issue of causation has been defended as well as the advantages of sharing the residual burden among causally co-responsible parties, both in order to overcome problems of causal uncertainty[22] and to control the activity level of different parties simultaneously, rather than focusing on one party only.[23] These arguments suggest that the same might apply to the charging of increased premiums to those parties who cause more accidents.

A second important point is how the insurance coverage should be financed. There are three main possibilities: the injurers should buy third-party insurance, the victims should buy first-party insurance or they should both contribute to the system in the same measure (for example the insurance could be paid by taxpayers and be publicly provided). This issue also affects the considerations made supra, and the need to control either party activity level bears

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[21] Shavell (1980a) and Parisi and Fon (2001).

[22] Shavell (1985) argues that when causation cannot be established with certainty the loss should be split among potential injurers according to the probability of their causal contribution. This way each injurer bears the statistical contribution of his activity to the accident.

[23] Parisi and Fon (2001) study the effect of loss sharing between non-negligent parties as a way to affect their choice regarding the activity level and show that sharing is at times superior to focusing on one party only.

on the choice of the financing system. Moreover, while the first solution disincentivizes injurers (in car accidents, for example, compulsory third-party insurance increases the overall cost of driving), the second disincentivizes victims (in car accidents, for example, it increases the cost of being a pedestrian), while the third method is rather neutral.

Therefore, the choice of how to finance the insurance coverage should be guided by consideration about the desirability of certain activities in the first place. The same issue, however, can be addressed from the point of view of the administrative costs that it triggers. It has been remarked that a system of first-party insurance might have lower administrative costs and for this reason some countries have abandoned the traditional injurer-pays paradigm and opted for a generalized first-party insurance system.[24]

7   Administrative costs, information and mixed solutions to the problem of providing incentives to take precaution

In this section we will address the issues of the information requirements of alternative incentive systems and the administrative costs thereof.

7.1   Information costs

It is often maintained that a tort law system, being based on a decentralized decision process, is more efficient with respect to gathering information than a regulatory and hence centralized system. In particular, under strict liability the optimal level of precaution is selected by the injurer and the legal and judicial systems need not to collect any information concerning it. However, once a negligence rule is in place, the due level of care must be set by the judiciary, the legislature or a regulatory body and the informational advantage of tort law only remains inasmuch as liability rules allow an individualized setting of the negligence criterion by the judge and parties are well placed for the ex post production of the relevant information and the ex ante prediction of the due level of care that will be applied in the case of litigation.

When parties are rather uniform in terms of costs and benefits, the individualization of the due level of care is too costly, or the production and acquisition of information are better dealt with at a centralized level, regulation appears to gain an advantage over tort liability also in terms of information costs.

Traffic safety may provide with a convincing example of a situation in which a

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[24] McEwin (2000).

centralized traffic authority is better placed than individual motorists, bicyclists and pedestrians, on the one hand, and judges, on the other hand, for the determination of the optimal levels of precaution. Moreover, the optimal levels of precaution seem to be very similar if not identical for injurers and victims within a certain class, and there might still be the possibility to differentiate among different classes of individuals (children, bicyclists, pedestrians, lorry drivers, car drivers, and so forth).

7.2   Administrative costs

Regulation triggers high enforcement and sanctioning costs, and insurance is costly to administer, but tort law is rather costly an incentive device too. Courts trigger a cost that can only be avoided by implementing no liability; lawyers' fees and the overall time and energy that parties spend in litigation or settlements amount to a social cost. Empirical studies have revealed that compensating victims through liability has an enormous cost if compared with the cost of compensating victims through insurance.[25] Moreover, the administrative costs of collecting fines or in general imposing sanctions are supposedly lower than the costs of making injurers pay damage compensation.

It is also true however, that some litigation might arise even in the presence of regulation plus insurance and that residual tort law will still yield a cost, albeit the determination of liability between litigants seems to be a simpler problem if the litigants are insurance companies rather than individuals.

It is again an empirical question whether in specific circumstances the overall administrative costs of a system based on regulation and insurance overcome the advantages in terms of more efficient accident prevention and total removal of risk from individual parties. It is conceivable, however, that regulation plus insurance will be superior in situations in which the number of parties is large, the technology is known by the regulatory body, the optimal mix of probability and magnitude of sanctions lies far away from the natural levels set by tort law and parties are seriously risk averse. Traffic safety seems again to match these requirements.

7.3   Extreme versus mixed solutions to the problem of accident prevention

When the requirements discussed above are not met, there will still be situations where the optimal solution is provided by tort law, as the administrative costs of implementing a centralized regulatory system might be too high, as for example for activities that are rarely

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[25] See Shavell (1987) at 263 for a survey of the empirical findings.

practiced, or are practiced by few individuals and do not yield particular risks or employ a new technology on which information would be difficult to acquire by regulators. Moreover, the literature has emphasized the existence of cases in which combining regulation and liability yields an improvement in terms of accident prevention.

8   Concluding remarks

In this article we have described a three-headed system in which (*i*) regulation provides incentive to take precaution, (*ii*) insurance removes the incentive otherwise produced by tort law in order to enable the free functioning of regulation and (*iii*) tort law serves the purpose to reduce the administrative costs of the insurance system. This way parties are delivered from risk and incentives are produced through an optimal mix of probability and magnitude of sanctions that would not be generally possible under tort law, as liability is based on a blindly set mix of probability and magnitude. Moreover, we have shown that this system allows for the control of activity level in a way that can be compared to tort law. Our findings further suggest that, if regulation, insurance and tort law interact the way we describe, insurance should be mandatory for accidental harm.

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