14 No-fault compensation systems

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14.1 Introduction
In 2000, McEwin (2000, p. 745) concluded by saying:

One thing seems clear. If we are concerned . . . with accident compensation, the tort law system is unsatisfactory.

This assertion relies on the law and economics literature, and more particularly on the no-fault advocates’ arguments, according to which the tort system would be deficient in providing sufficient compensation to accident victims.

The tort system is one of the oldest systems used to manage economic and social activities by allocating the burden of a loss to an injurer. However, since the 1960s, the implementation of no-fault compensation systems has continuously increased (traffic accidents, product accident, medical malpractice, etc.). Before the 1960s, no-fault systems were mainly (and logically) used for risks with non-identifiable injurers (natural risks, terrorism, etc.). Since then, in many fields, these systems have substituted the traditional tort system, even for risks with identifiable injurers. For example, we could have observed, in many countries, shifts to no-fault systems for automobile or product accidents (Keeton and O’Connell, 1971; Demsetz, 1969; Posner, 1975; Tunc, 1981; Schwartz, 1985; Schwartz and Mahshigian, 1987; Priest, 1989; Hensler et al., 1991; Croley and Hanson, 1991; Chapman and Trebilcock, 1992). This trend is even more conspicuous for workplace accidents (Ashford and Johnson, 1982; Chelius, 1990; Bruce and Atkins, 1993; Bilandic, 1995; van Velthoven, Chapter 16, this volume). Some countries are fervent supporters of no-fault systems and some of them even defend universal no-fault schemes, for all accidents. This is, for example, the case with New Zealand (Palmer, 1979; McEwin, 2000).

How to explain this trend towards no-fault systems? The unprecedented catastrophes of the 20th century and the liability insurance crisis of the 1980s have raised the question of the victims’ compensation for large, irreversible and/or latent damages. In this context, the worry of

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guaranteeing an equitable, fast and full compensation for all victims of an accident has caused tort reforms in many countries. These reforms took the form of switches from the traditional tort system to no-fault schemes. The protection of victims has thus become the main priority for governments and no-fault systems seem to be better instruments to reach this goal.

However, although the tort system is argued to be insufficiently distributive compared to no-fault systems, the law and economic literature also shows that it is far more efficient as regards accidents reduction (Barnes and Stout, 1992). Therefore, on the one hand, the tort system is deterrent but inefficient in protecting victims. On the other hand, no-fault systems are highly compensatory but fail to provide incentives to care. The two systems are thus imperfect. One gives priority to prevention, whereas the other gives priority to compensation. The literature is quite unanimous about this result.

Hence, it seems then that the debate is in a cul-de-sac. It appears that governments’ decision, as regards the implementation of one system, is simply taken according to the priority they want to favour.

Nevertheless, relying on the tools law and economic literature offers, isn’t it possible to reconcile (and maximize) prevention and compensation within the same system? How to combine the advantages of the tort and no-fault systems?

This chapter examines this question relying on the no-fault compensation and tort (negligence) systems literature. It aims first to show how no-fault systems are better at providing compensation than the negligence system (Section 14.2). Referring to empirical evaluations, it also shows that no-fault systems display inefficiencies which can be reduced within the tort system. Hence, a third system is examined: the strict liability system. There is a very thin line between the no-fault and the strict liability systems, but the latter allows priority to be given to the protection of victims while being within the tort system. Strict liability reinstates the injurer’s liability at the centre of the scheme. It conciliates prevention and compensation (Section 14.3). The necessary conditions for guaranteeing the efficiency of the strict liability system, and compensation systems in general, are then studied (Section 14.4). Section 14.5 gives examples of compensation systems based on strict liability for catastrophic risks. Section 14.6 concludes.

14.2 No-fault systems: the priority given to the protection of victims

14.2.1 Definition of no-fault systems
The traditional tort system, or negligence system, is basically articulated around the notion of fault. It implies that a tortfeasor is held liable if and
only if he has committed a fault or if he has been careless. As a result of this logic, the tortfeasor has to compensate the victims if he has been proven to be negligent by the legislator. The fault is defined according to a certain level of care enacted in the regulation. In this case, the tortfeasor liability is governed by the rule of subjective liability.

In contrast, no-fault systems are not based on the criterion of fault. They are systems whereby a victim receives automatic compensation from a third party without having to prove any fault or negligence. This third party can be the injurer himself but is usually a public collectivity or the State. No-fault systems are thus particular. They are outside the tort system since compensation to victims is totally disconnected from the tortfeasor’s liability or behavior. No-fault systems aim only at compensation and protection for victims independently of any notion of relative risk or level of care. As a consequence, within no-fault systems, when a risk is realized and an accident happens, victims don’t need to prove the injurer’s fault or negligence. They only have to claim compensation from the collectivity or the State concerned. No-fault systems are often coupled with compulsory self-insurance. That means potential victims are required to buy insurance to protect themselves against accidents. In case of an accident, compensation amounts are then paid to victims either via their own insurance or through public funds (from ‘accident funds’). Sometimes insurance is also public. This is the case with automobile insurance in Quebec for example, which consists of a fund collecting and pooling a unique premium for all drivers.

No-fault systems can have many different manifestations: government-provided compensation, public compensation scheme, but also first-party insurance. There are different degrees of no-fault systems between ‘pure’ no-fault and ‘mixed’ no-fault systems. Within ‘pure’ no-fault systems, victims obtain full compensation from their insurers (often public) or the State. This first category of no-fault has been implemented in Quebec, Northern Australia and New-Zealand.1 Within ‘mixed’ no-fault systems, insurers compensate the victims up to a certain threshold above which the latter can claim supplementary compensation against the injurer himself (Derrig et al., 1994). This second category thus maintains a link with the traditional tort system and is mainly practised in the United States.

For fifty years, no-fault systems have substituted for the tort system in several countries’ accidents legislation. How to explain such a trend?

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1 These systems are examined in Section 14.2.3.
14.2.2 The theoretical rationale of no-fault systems

No-fault advocates set forth three main advantages of no-fault over the negligence system: they provide higher compensation, they imply lower transaction costs and they generate lower insurance premiums.\(^2\)

14.2.2.1 Higher compensation

Within the tort system, compensation is given only if the tortfeasor has not respected the level of care defined by the judge. The corollary is thus that if the tortfeasor is proven to comply with this level, compensation will not be paid to victims. That is an important shortcoming highlighted by no-fault advocates. The question of the determination of the optimal level of care is an issue largely analysed in the literature and obviously influences the efficiency of the system (Shavell, 1986a, 1987).

Since no-fault schemes provide automatic compensation to victims, they are argued to be more distributive and thus more efficient. Moreover, relying on Carroll and Kakalik (1991a, 1991b, 1993), McEwin (2000, p. 739) shows that:

The tort system tends to overcompensate small losses and undercompensate large losses.

As far as compensation is concerned, no-fault systems are also considered as more moral. Indeed, with the tort system, victims are not completely protected. From a social and moral viewpoint, this will eventually become less and less acceptable. In particular, this is even less tolerated for unilateral accidents, where victims don’t contribute to the risk at all. This is the case, for example, with terrorist or natural risks.

14.2.2.2 Lower transaction costs

Beyond the compensatory advantage, no-fault systems also protect victims by reducing transaction costs. They reduce them in two ways.

First, Grabowski et al. (1989) and Devlin (1992) documented that since victims obtain compensation without pursuing the injurer, there are fewer lawsuits and thus, administrative costs are lower. Equally, compensation is made faster because the procedure is direct, avoiding legal intermediaries and court slowness (Kakalik and Pace, 1986; Studdert et al., 2006; Hersch and Viscusi, 2007).

Secondly, since the victims don’t have to prove the injurer’s fault or negligence, they are relieved of the costs of proof. This is an important advantage because the costs of proof might be very high, especially for industrial and

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\(^2\) Dewees et al. (1996) provide a complete and relevant survey of no-fault advantages.
technological risks which require advanced and qualified information. In those cases, victims often suffer from an informational asymmetry which prevents them from proving the fault or the negligence (Franklin, 1967; O’Connell, 1975; Chelius, 1976; Carroll and Kakalik, 1991a, 1991b). As a consequence, either the lack of information discourages victims straight away or the costs of proof are too prohibitive for them to continue their enterprise. Therefore, no-fault systems allow lower transaction costs, less waste and again, higher compensation. As O’Connell (1975, p. 461) points out:

With the savings from arguments over fault . . . , more peoples are eligible for payment from the insurance pool . . . . This is, in essence, the ‘miracle’ being wrought by no-fault auto insurance.

Relying on O’Connell (1975), McEwin (2000, p. 737) goes on:

Savings in legal costs and the other costs of administering a liability system mean that can be provided to those not compensated through the tort system.

14.2.2.3 Lower insurance premiums Literature on no-fault systems tends to show that tort reforms have a positive impact in terms of insurance premiums reduction. In this respect, empirical evaluations suggest that potential victims’ self-insurance is cheaper than injurers’ third-party insurance within the tort system (Dewees et al., 1996). Indeed, with the latter, the injurer covers himself against the risk he generates for third parties, in cases where he would be held liable. The insurer covers the potential claims the injurer is subject to as a result of his activity. These potential claims can be very large, especially for industrial and technological activities which generate catastrophic risks. Insurance premiums thus tend to increase. This rise has been accentuated for a few years by the liability insurance crisis.

With no-fault, insurance premiums may be lower because every potential victim (everyone) is constrained to self insure individually. In this way, insurers can pool and share the potential risk over a high number of policyholders. The literature generally reports that first-party schemes imply lower insurance premiums than third-party schemes (Caldwell, 1977; Zuckerman et al., 1990; McEwin, 2000). According to Priest (1989), the increase in third-party insurance premiums has increased interest in self-insurance. As regards tort reforms in the field of medical malpractice, Zuckerman et al. (1990) showed that they have led to decreased insurance premiums. This conclusion is also stated by Born and Viscusi (1998), Thorpe (2004) and Viscusi and Born (2005). Medical no-fault schemes,

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3 These studies specify, however, that the decrease in insurance premiums has been combined with statutory limitations on plaintiffs’ recovery.
however, are not common. Only New Zealand (1974), Sweden (1975) and Finland (1987) have implemented one. As a result, there are still few empirical studies on them.\footnote{In addition to the studies already mentioned, see Burt (1991) and more recently Studdert et al. (2004). For a more theoretical account, see Epstein (1976, 1978, 1986).}

From the three advantages mentioned above, no-fault systems thus seem to be preferable to the traditional tort system. They protect accident victims much more and they are cheaper in terms of transaction (legal and proof) costs and in terms of insurance premiums. The no-fault advocates rely on these arguments to refute the tort system.

### 14.2.3 Disadvantages of no-fault systems

In spite of their qualities, no-fault schemes also display shortcomings which may restrain their development. These defaults are of two types: one concerns their distributive (\textit{ex post}) dimension and the other concerns their preventive (\textit{ex ante}) dimension.

As far as compensation (distribution) is concerned, no-fault systems generally only take into account economic and direct damages in determining the compensatory amount. They thus don’t include in compensation amounts an important share of the damages suffered by victims, such as pain and suffering or revenue losses and medical fees. These damages are the so-called ‘non-economic’ or ‘indirect’ damages. Therefore, although no-fault systems protect victims, their compensatory dimension is limited by these restrictions. As the negligence system compensates for these types of damages, it can be considered more distributive in this respect (Rolph et al., 1985; McEwin, 2000).

As regards their preventive dimension, no-fault systems are often argued to be inefficient. These systems are basically not fault-based. The compensation is thus not risk-related and neither is its financing. Contrary to the traditional tort system, there is no legal or systematic link between the tortfeasor and the damage payment since liability is not a criterion in compensation. The criterion is the existence of damages. Further, insurance premiums are generally not risk-related neither. They are often the same for everyone regardless of their real exposition to the risk. They are thus usually not based on the likelihood of suffering from an injury. This disconnection between tortfeasor liability, risk and compensation may have a negative impact on care behaviour. As a consequence, no-fault systems are shown to decrease safety. On the contrary, the tort system is presented as more deterrent \textit{ex ante} because the injurer can avoid paying compensation...
by adopting cautious behaviour. He thus has a real advantage from being careful. It is generally argued that incentives to care are therefore better provided by the tort system. This is the main criticism of law and economics scholars against no-fault systems: they are presumed to increase the accident risk (Calabresi, 1977; Calabresi and Klevorick, 1985; Shavell, 1986a, 1987; Trebilcock, 1989). This is a familiar argument. Trebilcock (1989, p. 53) belongs to this school of thought and according to him:

It is assumed, without justification, that economic incentives do not influence individual behaviour. Neither theory nor empirical evidence supports this assumption.

The question of the choice between no-fault and tort systems is thus difficult to answer. What do empirical evaluations reveal in this respect? Are they unanimous about the superiority of no-fault over tort? What about Trebilcock’s (above) statement? Two examples of no-fault schemes will be used as illustrations of this argument: automobile insurance and universal no-fault schemes.

14.2.4 Examples and empirical evaluations

14.2.4.1 Automobile insurance No-fault systems for automobile accidents were first proposed by Keeton and O’Connell in 1965. In France, they are also defended by lawyers such as Tunc (1981). In the 1970s, the USA (1971), Northern Australia and Quebec (1978) switched from the traditional tort law system to a system of no-fault in this field. These systems generally require compulsory first-party insurance from all drivers. Therefore, each driver involved in an accident is insured and compensated regardless of his own contribution to the accident. For thirty years, these systems have been empirically evaluated. Their assessment is contrasted.

According to empirical studies, the introduction of traffic no-fault systems shows positive results. First, studies show, in conformity with the theoretical rationale, that administrative costs have decreased: Danzon (1985) and Devlin (1990) calculated that these costs have decreased by

5 Nevertheless, Fleming (1967) and Atiyah (1980, 1993) show that the deterrent effect of the tort law system might also be reduced by imperfect insurance that doesn’t properly penalize careless or unsafe behaviour.

6 Tunc (1981) proposed the introduction in France of a no-fault compensation system for victims of traffic accidents. This proposition was called ‘Project Tunc’ and had some echoes on the political scene. In particular, it led to the promulgation of the Robert Badinter Act on 5 July 1985 which partially excludes the notion of fault in the compensation scheme.
$94 million per year in Quebec. Carroll and Kakalik’s (1991a, 1991b) and Danzon’s (2000) results confirm this trend. Then, as expected, these systems have provided higher compensation enlarging the number of plaintiffs (O’Connell, 1975; Atkins, 1991; Dewees et al., 1996).

However, the most spectacular result of the introduction of no-fault systems for automobile accidents is negative: the increase in road fatalities. Indeed, in all the different countries where the tort reforms took place, studies report a decrease in safety.

In Quebec, Devlin (1992) and Gaudry (1992; Gaudry et al., 1995) show an increase in road accidents of 9.6 percent and 3.3 percent respectively. As a consequence of this increase, Devlin (1990) shows that the supplementary social cost equals $247 million per year, which largely cancels out the benefit in terms of administrative costs, mentioned above. Other empirical studies for Canada were led by Boyer and Dionne (1987), Boyer et al. (1990, 1991), Brown (1979, 1988, 1989) and Brown and Feldthusen (1988).

In Northern Australia, Swan (1984), Brown (1985) and McEwin (1989) present empirical evidence of an increase in road fatalities of 16 percent to 20 percent.

In the USA, there are two generations of studies. The first generation studies give ambivalent results: Landes (1982a, 1982b) and Medoff and Magaddino (1982) present a significant relationship between no-fault and the increase of accidents, whereas Kochanowski and Young (1985), DOT (1985) and Zador and Lund (1986) show the opposite and Kabler (1999) provides mitigating results. According to van Velthoven (Chapter 16, this volume), the methodology of these first generation studies is quite opaque. As far as the second generation North American studies (with improved econometric methodology) are concerned, apart from Loughran (2001), they are unanimous: they found an increase in traffic accidents after the 1970s as a result of weakened driver incentives. Cummins et al. (2001), Sloan et al. (1994) and Devlin (1999) reported an average increase in traffic accidents of 11 percent and Cohen and Dehejia (2004) an increase of 10 percent. This result is confirmed by Caminiti (1995a, 1995b). Cummins and Weiss (1993) showed that the number of claims has also significantly risen.

### 14.2.4.2 A universal no-fault system: the case of New Zealand

In 1974, New Zealand introduced a universal no-fault scheme for all accidents in its jurisdiction. This is an original and (so far) unique experience. This
system is governed by a public monopoly (the Accident Compensation Commission) and covers all personal injuries resulting from an accident (medical, professional, traffic, home, etc.).

The purposes of such an initiative were equity, efficiency and protection of victims. As McEwin (2000) presents it, this scheme is based on five principles (reported in the 1967 Woodhouse Royal Commission Report):

- Community responsibility
- Comprehensive entitlement
- Complete rehabilitation
- Real compensation
- Administrative efficiency

Independently of the place and the cause of the accident, the victim will be compensated. The notions of fault or liability are excluded from the scheme. Due to the scheme’s no-fault basis, people who have suffered personal injury do not have the right to sue an at-fault party, except for exemplary (punitive) damages. This scheme was also motivated by transparency care. Such a State organization allows easier empirical evaluations and thus, gathering data (Palmer, 1979). As reported by the Woodhouse Royal Commission, the organization (as amended in 1982 and 1992) is financed by the State through taxation collected for six accounts:

1. **Work-related injuries** are covered through a fund financed by employers on payrolls;
2. **Non-work-related injuries** (sport, home, etc.) are covered through a fund financed by earners on their earnings;
3. **Non-earners’ injuries** are covered by general taxation on revenues and social security;
4. **Traffic accidents** are compensated from funds (the Motor Vehicle Account) composed of drivers’ annual licensee fees and a tax on oil sales;
5. **Subsequent work injuries** are funded from employers, earners, non-earners and the Motor Vehicle Account;
6. **Medical injuries** are compensated through taxation on earnings and revenues.

The different accounts are managed by the State through a no-fault public insurance monopoly: the Accident Compensation Corporation (ACC, 1978a, 1978b, 1979). This public insurance was the sole (and compulsory) provider of accident insurance for all work and non-work injuries in New Zealand until 1988. Indeed, under pressure from chief executives
of major business firms in the country, the New Zealand insurance system was opened up to competition.\footnote{The governmental decision of 14 May 1988 facilitated this opening up to the private sector.}

This universal no-fault scheme was first assessed at the end of the 1970s: the assessments were mainly led internally by the Accident Compensation Corporation and aimed at collecting data on financial flows, levels of taxation, evolution of claims and at estimating the overall cost of the system. As with studies in the field of automobile accidents, the results of these assessments are entirely satisfactory. On the one hand, Palmer (1979) showed that compensation amounts have been increased substantially. This result is positive as regards the scheme’s purposes and principles (mentioned above). On the other hand, however, a significant rise in injury cases has also been recorded, coupled with the appearance of some inefficiencies, especially from employees in the workplace. Relying on Palmer (1979), McEwin (2000, p. 744) indeed reports the following.

Soon after the scheme began, employers started to complain that injury rates had soared. In particular, complaints from the meat-freezing industry led to the ACC setting up an independent inquiry. The inquiry found that lost working time in the meat-freezing industry increased by 92 percent in the first two years.

As far as motor vehicle accidents are specifically concerned, Swan (1984), Brown (1985) and McEwin (1989) documented an average increase in fatalities of 18 percent after the switch to no-fault.

Hence, as regards the increases in injury rates and accidents, the under-deterrent effect of no-fault systems can again be blamed.

Empirical evaluations of the New Zealand universal no-fault scheme are still not very numerous. However, the existing studies show ambivalent results. On the one hand, the scheme better protects accident victims. On the other hand, it seems to be insufficient to maintain adequate care incentives. Still, from a theoretical law and economics perspective, it is essential that in no-fault systems incentives should still be built in, both for risk takers and for victims. In this respect, let us note the successive amendments to the ACC aimed at improving incentives and efficiency of the system. The 1982 amendments (as reported in McEwin, 2000) consisted in shifting from a fully-funded to a ‘pay-as-you-go’ system, with restrictions on some compensation rights. The 1992 amendments reorganized earners’ accounts financing and enacted the Accident Rehabilitation and Compensation Insurance Act, the goal of which was to control premium costs in the system.
Referring to these empirical results for automobile accident no-fault or universal no-fault systems and to the criticisms levelled against traditional tort law, it seems rather difficult to conclude definitively between fault or no-fault. The debate appears to be infinite since none of them seems to be a first-best solution. Maybe the debate could be opened up and improved by orienting considerations towards a third system: the strict liability system.

### 14.3 No-fault versus strict liability systems

#### 14.3.1 Definition of the strict liability system

The *strict liability* scheme is a hybrid legal system. Although it belongs to the tort system, it is halfway between the no-fault and negligence systems.

Like no-fault schemes, the *strict liability* system is not fault-based. When an accident occurs, victims don’t need to prove the injurer’s fault or negligence to obtain compensation. There is thus a very thin line between no-fault and strict liability systems. That is the reason why scholars in the law and economics literature sometimes deal with them as equivalent systems. Still, the line between them is far from being insignificant.

On the one hand, within strict liability systems, evidence of damages is not sufficient to make a claim result in indemnification. Indeed, contrary to no-fault, this system requires a link to be made between the prejudice and the tortfeasor’s activity. The mere existence of the injury is not enough. The causal effect between the injury and the risk generated by the potential injurer has to be shown. After this link has been shown in the courts, victims can claim compensation.

On the other hand, compensation is not (or not in the first resort) financed through public funds but is funded out of the injurer’s own resources. The major difference between strict liability and no-fault consists then in relating compensation to injurers’ financial assets, and thus relating compensation to their liability. While (pure) no-fault systems abolish tort claims altogether, strict liability rehabilitates liability at the centre of the legal system. Hence, to obtain compensation, victims have to litigate a claim and pursue the tortfeasor himself.

From these two standpoints, the strict liability system appears to be much further removed from no-fault than it was at first sight. As a matter of fact, since it is liability-based, the strict liability system belongs to the tort system. Nevertheless, since it is not fault-based, it is more advantageous to the victim.

#### 14.3.2 The advantages of strict liability

What then are the advantages of such a third system? The scheme is also called an *objective* or *absolute* liability system. Belonging to the tort system,
it still manages to bridge no-fault and negligence systems in combining their respective advantages.

First, compensation is not strictly speaking ‘automatic’ but is still guaranteed. Indeed, contrary to the traditional (negligence) tort system, strict liability implies that the injurer is always held liable whatever his behaviour. That means that, once the causal link between his activity and the prejudice has been demonstrated, the tortfeasor is legally bound to pay compensation to victims even if he has not been careless. This particular clause aims at palliating two problems: the possible misestimating by the judge of the level of care that is to be complied with and the undercompensation of victims.

As to the first problem, the law and economics literature showed that the precise determination of the optimal level of care might be hindered by uncertainties around the risk considered (Epstein, 1973, 1980; Shavell, 1987). Information costs are thus high. This is particularly the case with catastrophic, technological or development risks (Epstein, 1996; Faure, 2007). Under a negligence rule, it is the judge who fixes care levels. Given his potential lack of information, he might underestimate them. Of course, this problem can be reduced when the care level has been determined through safety regulation. In this case, the judge can be assisted by the legislator. Safety regulation can thus lead him to know what the minimum is that should be required from an injurer. However, in cases where the statutory level of care is set too low, the judge may still be required to examine whether the optimal care level was higher than the level of care under the regulation and thus still bears the information costs of finding out what optimal care was. These costs of information are avoided under strict liability, which allows victims to obtain compensation even if the injurer has complied with safety regulations. All the information costs are thus shifted to the injurer.

As far as the undercompensation problem is concerned, it is related to the previous one. With the tort system, the injurer compensates victims only if he has been negligent. There might thus be a large number of cases where victims are not indemnified for their injuries. From an ex post viewpoint, the strict liability system is thus efficient.

Secondly, since compensation is now related to risk, the tortfeasor plays a central role. On the one hand, his activity is identified as the potential origin of a risk. On the other hand, he is financially engaged. As a result, strict liability is usually considered as efficient by the law and economics literature because the tortfeasor is exposed to liability under this scheme and thus has excellent incentives for accident reduction. We understand here the essence of Trebilcock’s (1989) viewpoint (quoted above). Compensation is funded by the tortfeasor himself (and his insurer) and
not by a mass of anonymous payers. This again reinforces his incentives to be careful in order to protect his resources. Since he cannot theoretically escape from his liability in case of an accident, he will implement every appropriate safety measures in order to avoid the accident and thus to avoid being condemned. From an *ex ante* standpoint, the strict liability system is thus efficient as well.

### 14.4 The efficiency of compensation systems: the necessary conditions

Combining the advantages of no-fault (protection of victims) and negligence (care incentives), the strict liability system has been increasingly implemented worldwide. Its success is mainly due to the fact that, within the tort system, strict liability still allows for the protection of victims. However, like other compensation systems, strict liability might face some failures which might decrease its efficiency (prevention and protection of victims). Therefore, in order to strengthen it, three conditions have to be fulfilled.

#### 14.4.1 Unlimited liability/compensation amounts

The first hindrance a compensation system has to overcome is underdeterrence. We saw that the tort system is commonly argued to be more deterrent than no-fault systems. Still, underdeterrence can be observed for any compensation systems even within tort. This failure is mainly due to the fact that compensation systems are often coupled with some legal restrictions as regards amounts of compensation and liability. One of the most important restrictions is liability capping.

Liability capping consists in limiting the injurer’s liability and duty to compensate financially. Within tort, that means that the injurer is legally held fully liable for the damages in case of an accident, but he is only partially liable economically. He has thus to pay only a share of the damages, up to a limit fixed by the legislator. This legal principle is commonly justified by the fact that it allows the insurability of the risk. The risk, in particular if it is catastrophic or unforeseeable, would not be insurable on insurance markets without this limitation (Berliner, 1982; Faure and Fenn, 1999; Skogh, 1998; Courbage and Liedtke, 2003; Faure, 2004). Nevertheless, this limitation causes three major problems.

First, the tortfeasor might adopt an insufficient level of care to prevent accidents. Since his liability is financially capped, he might be rationally induced to protect his financial resources up to the cap, and nothing more. He will thus adopt a level of care which allows him just this protection. In any case, above his own resources, he is, by definition, insolvent. Whether there is a cap on his liability or not, the problem thus arises from the fact that the tortfeasor’s level of care might be insufficient to prevent accidents.
In addition, accidents could cost much more than the financial cap (depending upon its level) and/or much more than the injurer’s total resources. Therefore, limited liability generates a second problem: the risk that, if damages exceed the injurer’s liability cap, victims won’t be fully compensated. This is particularly the case for catastrophic risks where damages might be very large. Examining strict liability systems, Faure (1999, p. 8) points out:

In the literature it has been indicated that there may be good reasons to favour a strict liability rule for major industrial accidents, the main reason being that only a strict liability rule would lead to a full internalization of those highly risky activities. Only with strict liability the potential injurer would also have an incentive to adopt an optimal activity level. This full internalization is obviously only possible if the injurer is effectively exposed to the full costs of the activity he engages in and is therefore in principle held to provide full compensation to a victim. An obvious disadvantage of a system of financial caps is that this will seriously impair the victim’s rights to full compensation.

Even within pure no-fault systems, the problem of undercompensation exists if limitations are set on compensation amounts. As a consequence, combining compensation systems with liability/compensation caps is inconsistent with the initial purpose of these systems: protecting victims of accidents. Further, the financial liability limit is also sometimes coupled with a limitation in time. This limitation takes the form of prescribing terms after which victims can no longer pursue the tortfeasors. These terms are unfavourable to victims, especially when damages are latent and/or hereditary. In this case, the goal of protection of victims might not be achieved.

Thirdly, when compensation systems (especially within the tort system) are coupled with liability limits, they might prevent tortfeasors from internalizing all the risk costs they generate by their activity. The importance of the internalization of the risk costs by tortfeasors has been analysed *inter alia* by Coase (1960). The internalization rule implies that tortfeasors assume the whole risk they generate by bearing the costs of prevention and costs of compensation (through, for example their insurance). If the risk concerns an industrial or commercial activity, the full internalization of the risk supposes that these costs are passed on to consumers at the sell price, so that the price reflects the real producer’s costs. However, when liability/compensation is capped, the internalization is partial and the costs passed on in the price are thus artificially low. As a consequence, the price is no longer a correct signal to consumers. This might lead to overconsumption and overproduction.

How to remedy these three problems?

As regards underdeterrence and under-internalization, these can be solved through the substitution of caps by unlimited liability or full
compensation. As Faure (1999) points out, most important is that injurers are fully exposed to the risk they generate. In this way, they will internalize their whole risk costs, thus inducing an increase in their level of care. Let us note, however, that unlimited liability is economically purely theoretical given that the tortfeasor’s financial assets are never infinite. Therefore, even if his liability is unlimited (within the tort system), he will protect his whole resources (and nothing more). Nevertheless, his level of care will surely be higher than with a liability cap.

As to compensation, it could be funded to a greater extent through the private sector, with States paying for excess damage if needed. This intervention is thus a means of remedying undercompensation. Even within the tort system, States often provide supplementary compensation through public funds, above the injurer’s liability cap (or once all his resources have been used up in the case of unlimited liability). In this case, States can act in two distinct ways: either they intervene graciously by paying direct compensation to victims (States are thus helpers of last resort), or they make the tortfeasor pay for their intervention (States are thus reinsurers).

14.4.2  Safety regulation
To strengthen the deterrent effect of compensation systems, safety regulation is often necessary. This argument has been widely analysed in the law and economics literature, in particular by Shavell (1984a, 1984b). As Shavell (1984b, p. 271) points out:

Neither regulation nor liability . . . leads all parties to exercise the socially desirable levels of care. Regulation does not result in this outcome because the regulatory authority’s information about risk is imperfect, while liability does not create sufficient incentives to take appropriate care because of the possibility that parties would not be able to pay fully for harm done or would not be sued for it. But as is stressed, it is often socially advantageous for the two means of controlling risk to be jointly employed—for parties to be required to satisfy a regulatory standard and also to face possible liability.

Safety regulation allows the raising of the level of care adopted by the potential tortfeasor by imposing care standards and rules on him. These standards and rules are enforced by the legislator and are coupled with negative sanctions in case of no application (going from pecuniary penalties to imprisonment). These may concern technological processes, materials, maintenance procedures, etc. In this way, safety regulation reduces moral hazard. Safety regulation is particularly crucial for activities which generate catastrophic risks or risks which are still marked by uncertainties, such as some technological or industrial risks.
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Safety regulation is thus an exogenous additional source of incentives. Some scholars set forth another (endogenous) source of deterrence: within some industries, the ‘reputation effect’ is considered a powerful tool of prevention (Brissette, 2005; Laurent, 2005). Through this effect, it is considered that industrial tortfeasors are spontaneously induced to prevent accidents, independently of legislative sanctions or legal liability, because there is a real gain in maintaining the reputation and the image of their industry. This is, for example, the case for nuclear operators, who have much to gain from avoiding another Chernobyl.

14.4.3 Compulsory insurance

A final problem raised by compensation schemes and linked to the risk of undercompensation mentioned above, comes from the potential tortfeasor’s insolvency. This problem is named by Shavell (1986b) ‘the judgement proof problem’. Although no-fault-based systems aim at guaranteeing victims’ compensation, this purpose might be thwarted if the injurer is de facto unable to pay the whole reparations. This is particularly the case with catastrophic risks generated by small operators for whom assets are restricted. Even with a liability cap, it is thus possible that the tortfeasor can’t compensate victims (if his resources are lower than the cap). Therefore, the most common solution to this problem is for the State to impose compulsory insurance, either on the potential tortfeasor (third-party insurance), or on the potential victims (first-party or self-insurance).

Referring to the examples of automobile and products accidents, McEwin (2000, p. 735) said:

Victims are made to buy self-insurance or tortfeasors are made strictly liable and forced to buy liability insurance, or some combination. For example, automobile no-fault systems typically cover the driver-owner (self-insurance) as well as other drivers of the vehicle, passengers and any pedestrians injured by the vehicle (compulsory strict vehicle liability insurance). Product liability no-fault schemes involve imposing some form of strict liability on producers coupled with compulsory liability insurance (self-insurance may be permitted).

In the case of bilateral accidents (such as traffic accidents), first-party insurance and third-party insurance are generally required by the State. However, in the case of unilateral accidents, most of the time only third-party insurance is required. For instance, in the field of catastrophic risks, where the injurer can be identified (industrial and technological risks), compulsory insurance is generally imposed upon him. This constraint is justified because, given that victims cannot contribute to the risk and that they suffer from asymmetric information, it is considered that insurance has to be taken out by the tortfeasor himself. On the one hand, he is the
sole person to influence the risk. On the other hand, he has better quality information to measure and prevent the risk. Moreover, insurers who cover these specific risks (nuclear risk, chemical risk, etc.) are generally specialized in this type of coverage. Therefore, they can share with operators information about the risk and price it better. Insurance premiums are thus risk-related and better reflect this. In this respect, it is often argued that third-party insurance for catastrophic risks leads to fairer pricing for insurance premiums than first-party insurance.

Compulsory insurance is an efficient tool to guarantee tortfeasors’ solvency and thus to strengthen the efficiency of compensation systems. It can also be combined with guarantees and/or financial securities required from the tortfeasor and his insurer. These solutions may contribute to reducing adverse selection as well. In this respect, although compulsory insurance is favourable to victims as far as compensation is concerned, it has to be coupled with risk differentiation to be an effective deterrent. Indeed, risk differentiation is essential to reduce adverse selection. Relying on Priest (1996) and Epstein (1996), Faure (2007, p. 346) argues:

An adequate differentiation of risks and premiums is a remedy to adverse selection . . . . Government relief programs have been insufficiently able to provide incentives for prevention as risk differentiation under insurance does.

To be sufficiently deterrent and to maximize the protection of victims, compensation systems may need to be combined with a variety of additional legal and economic instruments: unlimited liability and compensation amounts, State intervention, safety regulation and compulsory insurance. For example, as McEwin (2000, p. 745) sums it up:

Different combinations of insurance/safety regulation should be considered in terms of their ability to provide optimal compensation and safety.

In this way, compensation legal designs are made efficient.

14.5 Examples of compensation systems (based on strict liability) for catastrophic risks

Compensation systems for catastrophic risks are specific. Catastrophic risks are special risks: they are rarely foreseeable and their damages might be irreversible, large and cross-border. There are two categories of catastrophic risks:

- Catastrophic risks with non-identifiable causes: these concern natural risks (storm, flood, hurricane, earthquake, etc.) and terrorist risks. For these risks, most of the time, States implement no-fault
compensation schemes and take charge of an important share (or the whole) of damages. Self-insurance is often required from potential victims for property damages. Personal injuries are mainly financed through social security.

- Catastrophic risks with identifiable injurers: these concern industrial and technological risks (chemical, nuclear, oil pollution, etc.). Given the specific characteristics of these risks, they are generally governed by a no-fault-based tort system, and more particularly by strict liability. Strict liability is indeed increasingly used to manage compensation of catastrophic accidents. A precise person is thus named by the legislator as liable in case of an accident. We present herein two examples of these schemes: compensation for nuclear and marine oil pollution accidents. In a sense, these are hybrid systems, given that they are based on the one hand on strict liability and on the other hand, on government compensation.

14.5.1 Compensation for nuclear accidents

Civil liability, in the case of a nuclear accident, is governed by three international Conventions: the Paris Convention (1960), the Brussels Convention (1963) and the Vienna Convention (1963). The Paris and Brussels Conventions are the pioneers in the field of nuclear civil liability. They were drafted by the NEA (Nuclear Energy Agency), an OECD (Organization for Economic Cooperation and Development) agency, in order to manage nuclear operators’ liability, in case of an accident at their installations. For now, the Paris and Brussels Conventions have been ratified by twelve contracting countries (all western European). The Vienna Convention has been enacted by the IAEA (International Atomic Energy Agency) for thirty-two countries from Asia, South America and Eastern Europe. These three international Conventions have been revised several times ever since. The last amendments of the Paris and Brussels Conventions were drafted in 2004 (but have not yet entered into force) and the last amendments to the Vienna Convention were adopted in 1997. Although they are OECD countries, the USA and Canada are not members of these international Conventions; they have their own national nuclear liability regimes. However, their regimes are very close to the Conventions in their principles.

The nuclear civil liability Conventions are all based on the same liability principles. They are no-fault-based. The liable person named by the legislator is the nuclear operator. His liability is strict, limited and channelled. In case of an accident, the nuclear operator will always be held liable for compensation, whatever his contribution to the risk and whatever his level of care. Of course, in the nuclear industry, safety regulation plays an
important role in accident prevention. It is controlled today by national and international agencies and it relies on the 1994 IAEA Convention on nuclear safety. This safety regulation aims at remedying the lack of incentives generated by the nuclear operators’ liability limit. Since the 2004 amending Protocols, their liability is limited to €700 million per accident.

As regards this cap, two remarks can be made. On the one hand, the liability limit is defined ‘per accident’ and not ‘per reactor’. This implies that whatever the number of reactors an operator runs, he has to cover the same amount of damages. The risk is thus not differentiated. However, an operator who runs fifty-eight nuclear reactors (such as the French operator EDF) might generate a much higher risk than an operator which has only seven reactors (such as the Belgium operator Electrabel NP) (Faure and Skogh, 1992). On the other hand, the current cap is far lower than the cost of a major accident which is estimated at between €10 billion and €100 billion. For example, the Chernobyl accident cost amounted to €40 billion. As a consequence, because of the cap, nuclear operators internalize only a share of their risk costs and the problem of underdeterrence, mentioned above, might appear (Faure and Van den Bergh, 1990; Faure, 1995). Safety regulation aims precisely at palliating this negative effect. Besides, it is much stricter than for other industries. The safety standards are draconian.

As regards channelled liability, nuclear operators are not only always held liable in case of an accident, but they are also solely liable. This principle is called legal channelling or exclusive liability. It implies that the operator will be held liable even if another partner of the production chain (radioactive wastes carrier, reactor builder…) has contributed to the accident. This principle is justified by the fact that it makes pursuance easier for the victims. Indeed, channelling liability on a unique person avoids the multiplication of procedures against several nuclear actors and the possible redundancy or contradiction of their respective conclusions. By identifying a uniquely liable person, channelled liability thus allows the acceleration of judicial procedures and makes payment of compensation faster. In this way, this principle is consistent with the priority of no-fault-based systems, the protection of victims. However, we can also see in channelled liability a disadvantage for victims as far as deterrence is concerned. Indeed, channelled liability on operators might induce underdeterrence for the operators’ partners (Faure and Hartlief, 1998; Van den Borre, 1999). What, for example, would be the safety incentives for the radioactive wastes carrier if he is never held liable in case of an accident during transport? According to the Conventions, the nuclear operator of the installation which the convoy has left is designated as liable. To prevent underdeterrence of the nuclear operator’s partners and to avoid him bearing the charge of damages caused
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by others, nuclear operators must thus drastically control their behaviour. They have several means of doing that. For example, they can include specific liability clauses in their contracts which make partners jointly liable for reparations. As a result, the liability remains legally channelled on operators but is economically cumulative and solidary. In most countries, the nuclear industry is vertically integrated. In those circumstances, the control of each partner should be easier for nuclear operators than in an atomistic market.

As far as compensation is concerned, compulsory insurance is imposed on nuclear operators to guarantee their solvency. Nuclear operators cover their liability cap today mainly by resorting to national insurance pools. As regards the possible gap between the operators’ liability limit and the damages of a nuclear accident, the Conventions have implemented two additional risk layers based on public funds: the first additional risk layer is financed by the State where the nuclear accident occurs (up to €500 million) and the second additional risk layer is jointly supported by the contracting countries (up to €300 million). The public financing of compensation is important in the nuclear industry. Above the total amount of compensation (€1,500 million), the Conventions do not specify who has to pay the potential excess damages. We may expect that States would finally pay for these damages in the last resort. These amounts have been enacted by the 2004 amending Protocols, but have not yet entered into force.

14.5.2 Compensation for marine oil pollution accidents

Civil liability in the case of marine oil pollution accidents is also governed by an international Convention. This Convention was drafted under the auspices of the IMO (International Marine Organization) in 1969 and was last revised in 1992. Today, 117 countries are members of this Convention. Like the nuclear liability Conventions, this regime is based on (no-fault) strict liability. The liable person designated by the law is the oil tanker owner.

Again, the tankers owners’ liability is strict, limited and channelled. They are always liable independently of their fault or negligence. Their liability is financially limited to between $7 million and $136 million per accident. Let us note that, in contrast to nuclear liability Conventions, the liability cap is here differentiated according to the risk generated by each oil tanker owner. Indeed, it is considered that the heavier is the tonnage (the higher the quantity of oil conveyed), the higher is the risk. The differentiation includes three layers: the owner’s liability cap amounts to $7 million for gross tonnage up to 5,000 units, between $7 million plus $955 per additional unit for gross tonnage between 5,000 and 140,000 units and to $136 million for gross tonnage exceeding 140,000 units. Like nuclear operators, oil tanker owners are also bound by legal channelling.
As far as the problem of deterrence is concerned, we encounter the same problems mentioned above. To avoid the underdeterrent effect of the liability cap and channelling, oil tanker owners are also subjected to compulsory insurance. To cover their cap, 95 percent of them co-insure through a pool: the International Group of Protection and Indemnity Clubs (P&I Clubs). In contrast to nuclear insurance pools, this pool is not national but international. It comprises thirteen national P&I Clubs (Faure and Heine, 1991; Wren, 2000; Mason, 2003; Faure and Hu, 2006; Huybrechts and van Damme, 2006; Wang, 2006, 2007).

Moreover, these pools are not insurers’ pools but horizontal risk-sharing agreements between tanker owners. The main advantage of this kind of pool consists in the fact that each participant contributes to the pool according to the risk he generates (his tonnage). If an accident occurs over the period, the joint contributions are used to pay compensation. Then, the contributions are re-paid by each participant to reconstitute the capacity of the pool. However, if no accident occurs over the period, the contributions can be taken back by the tanker owners and used for other purposes. This is a major advantage over insurance whereby premiums are lost by policyholders, whether there is an accident or not.

As far as compensation is concerned, it is here again necessary to guarantee the tankers owners’ solvency. If the cost of a marine oil pollution accident exceeds the cap, the tanker owner does not have to pay the excess damages. In order to avoid undercompensation, the IMO 1992 Convention planned two additional risk layers to supplement the individual tanker owner’s caps. These are financed by two compensation funds: the IOPC 1992 (International Oil Pollution Compensation Fund) and the Supplement IOPC 2003. These funds are intergovernmental organizations run by the IMO. The IOPC 1992 is funded by taxes charged on oil conveyed by sea. This fund increases the compensation amount available up to $307 million. As regards the IOPC 2003, it is optional and open to every IOPC 1992 member. It is funded similarly and raises the total compensation up to $1200 million per accident. States play no role in the IOPC’s financing. Unlike the two additional nuclear risk layers, these IOPCs are exclusively financed by private funds. IOPC are also coupled with a compensation device established on a voluntary basis. This device relies on two agreements: the STOPIA 2006 (Small Tanker Oil Pollution Indemnification Agreement) for small oil tankers, and the TOPIA 2006 (Tanker Oil Pollution Indemnification Agreement) for the others. These agreements imply that, after an accident, the member designated as liable has to reimburse a share of the amount paid by the IOPCs to compensate the victims. The internalization of the risk costs is thus maximized. Although States do not explicitly finance any risk layers in this no-fault-based scheme, we can
still expect that, if damages exceed the available compensation amounts, they will pay for them in the last resort.

14.6 Conclusions
In the law and economics literature, the debate between no-fault and the tort systems is well known: the negligence system is argued to be highly preventive but insufficiently compensatory, whereas no-fault is considered to be underdeterrent though much more distributive. This chapter has examined this debate. It has shown that neither compensation system was perfect and considered a third system: the strict liability system. There is a very thin line between pure no-fault (which abolishes the tort system altogether) and strict liability, but the latter belongs the tort system. It is a hybrid scheme whereby tortfeasors’ liability is engaged, though it is not based on the notion of fault. Compared to the other compensation systems, it has considerable advantages given that it allows two major priorities to be reconciled. On the one hand, it protects victims in maximizing compensation amounts; on the other hand, it provides incentives to injurers to prevent accidents. Whether it is based on fault or not, any compensation scheme needs important conditions to be efficient. This chapter has shown that combinations with safety regulation, State intervention, financial securities or compulsory insurance are often necessary to guarantee tortfeasors’ solvency and incentives to care and maximize compensation. Two examples of compensation systems, based on strict liability, were used to illustrate the argument: nuclear and marine oil pollution schemes.

Finally, the choice of one system instead of another is basically a political choice. No compensation system, taken alone, is a first-best solution. It always has to be combined with other tools amongst a large range of legal and economical instruments offered by the law and economics literature and accumulated from practical experiences.

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