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Incentive Effect of Liability Rules in the Presence of Liability Insurance in the Maritime Law Context: An Economic Analysis

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Incentive effect of liability law may be affected by the presence of liability insurance. Apparently when a party has liability insurance and does not have to pay directly from its own pocket, it will have less motivation to exercise proper care. This tendency of an insured is known as "moral hazard." There are many studies on the problem of "moral hazard" and on various mechanisms how to address it. Yet, there is a lack of academic discussion on comparative analysis between liability law and liability insurance in terms of their effect on creation of incentives; that is, whether liability law alone induces best care or whether liability insurance with its various incentive mechanisms leads to better care. Of course, liability insurance cannot exist without liability law. This paper argues that the presence of liability insurance produces better incentives towards care than liability law alone.

Les effets incitatifs du droit de la responsabilité peuvent être affectés par l'existence d'assurance responsabilité civile. Quand une partie a souscrit une assurance responsabilité civile et n'a pas à payer de sa poche, elle n'a qu'une motivation réduite de prendre les précautions adéquates. Cette tendance à la négligence chez les assurés est appelée « risque moral ». Il existe de nombreuses études sur le problème de « risque moral » et sur les divers mécanismes utilisés pour le résoudre. Malgré cela, il y a absence de discussion théorique sur une analyse comparative du droit de la responsabilité et de l'assurance responsabilité pour ce qui est de leur incidence sur la création de mesures incitatives; c'est-à-dire, la responsabilité seule incite-t-elle à prendre les meilleures précautions possible, ou l'assurance responsabilité et ses diverses mesures incitatives mènent-elles à améliorer les précautions en place? L'assurance responsabilité civile ne peut évidemment pas exister en l'absence de droit de la responsabilité. Selon l'auteur, l'existence d'assurance responsabilité a comme corollaire de meilleures mesures d'incitation à la prudence que la responsabilité seule.

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Introduction

The main questions examined in this paper are whether liability insurance is a complementary force in the incentive effect of liability law and, if so, whether insurance can lead to better incentives than liability law alone.[1] Apparently when a potentially liable party does not have to pay directly from its[2] own pocket due to the fact that it has insurance, it will have less motivation to exercise proper care. This phenomenon is known in the insurance literature as "moral hazard"[3] i.e., the tendency of an insured to relax precaution levels against potential loss or liability. However, there are various insurance and legal mechanisms to prevent the problem of moral hazard.[4] Insurance mechanisms provide financial incentives through premium rate variance and coverage restrictions, while legal mechanisms strengthen the existing informational advantage of an insurer. Superior information helps an insurer to determine more accurately than the courts the expected loss/liability[5] from insured activities and then to decide what the optimal care would be to prevent such loss. The ability to create strong financial incentives through insurance mechanisms gives an insurer leverage to influence the precautionary steps taken by the insured and to bring actual care closer to optimal care. Thus liability insurance can be a complementary force in the realization of the functional goal of liability law in creating incentives towards optimal care.[6] In fact, the existence of

1. Prof. Fleming James asked the same questions in sixty years ago in his article "Accident Liability Reconsidered: The Impact of Liability Insurance" (1948) 57 Yale L. J. 549 at 557 [James, "Accident Liability Reconsidered"]. Although my answer to the questions coincide with his, his answers were mainly based on some empirical evidence to the effect that accident rates have dropped in some areas where liability insurance is available. See *ibid.* at 557-563. I, on the other hand, have undertaken a comparative analysis of informational strength of courts and liability insurers and that of the financial incentives of liability law and insurance mechanisms to induce potentially liable insureds to take precautions. I have also used some empirical evidence.

2. As both an insured (shipowner) and insurer are usually corporations in maritime liability context, I will use gender-neutral pronouns to refer to them.

3. See Kenneth S. Abraham, *Distributing Risk: Insurance, Legal Theory, and Public Policy* (New Haven: Yale University Press, 1986) at 14 [Abraham, *Distributing Risk*]. See also K. J. Arrow, "Uncertainty and the Welfare Economics of Medical Care" (1963) 53 Am. Econ. Rev. 941 at 961-62; M. Pauly, "The Economics of Moral Hazard: Comment" (1968) 58 Am. Econ. Rev. 531 at 535 [Pauly, "The Economics of Moral Hazard"].

4. The insurance mechanisms include rate variance, deductibles, policy limit, policy exceptions, etc., while insurance law prevents moral hazard through the duty of disclosure in contract pre-formation stage, insurance warranties, and principles of insurable interest and of indemnity, among others.

5. A defendant's liability usually equals the loss suffered by the plaintiffs. I will, therefore, use the words "loss" and "liability" interchangeably unless expressly stated otherwise.

6. In the presence of widespread accident and liability insurance, the main justification of liability law lies in its deterrence effect on negligent conduct and not in compensation of victims. See Steven Shavell, *Foundations of Economic Analysis of Law* (Cambridge: Harvard University Press, 2004) at 267-269 [Shavell, *Foundations of Economic Analysis*].

liability insurance may lead a potentially liable insured to exercise better care and solicitude than what would be the case with liability law alone, the main reasons being better information possessed by insurers and stronger financial incentives created by insurance mechanisms. Other reasons include possible higher price paid by the insureds for being negligent in the presence of insurance than in its absence, development of better preventive techniques through insurers' research and innovation, likelihood of better education on loss-prevention by the insureds in the presence of insurance, and the dependence of the very survival of an insurer's business on its ability to prevent moral hazard.

In Part I, I discuss briefly the interplay between liability law and liability insurance both in an ideal and in the actual world. Part II contains arguments in support of the main proposition of the paper that liability insurers can induce better incentives in the mind of potentially liable insured parties towards care than can the courts with the liability law alone, while Part III presents some empirical evidence on the validity of the proposition. Although the issue pertains to every area of liability law and insurance, the paper will analyze the question in the context of maritime liability and marine insurance.[7]

I. *Liability law and liability insurance in an ideal and in not-so-ideal worlds*

1. *No liability law and liability insurance in a perfect world*

In a world of perfect information and costless transactions, there would arise no need for liability law or, consequently, for liability insurance. It takes two parties for a liability to exist. In the perfect world, whenever the benefit from the prevention or reduction of a loss through care is more

7. Like any form of insurance, marine insurance is a means to manage risk through distribution of risk over a large number insureds ('interpersonal spreading') and/or through shifting the individual insured's future risk to the insurer in exchange of present premium ('inter-temporal spreading'). See Guido Calabresi, *The Costs of Accidents: A Legal and Economic Analysis* (New Haven: Yale University Press, 1970) at 42-43 [Calabresi, *The Costs of Accidents*]. It is noteworthy that insurance is only one of many means to manage risk. Other risk management strategies include personal saving, diversification, contract for future goods and services, and safety precautions: Abraham, *Distributing Risk*, *supra* note 3 at 2, 67. Risk management through marine insurance involves protection against the loss of a ship (hull insurance), its potential earning capacity (freight insurance), its onboard cargo (cargo or liability insurance, depending on who bears the burden of cargo loss), and protection against liability arising from the operation of the ship (liability insurance). Marine insurance can be further divided on the basis of duration of coverage into time and voyage policies and on the basis of the amount of coverage into valued and unvalued policies.

than the cost of care,[8] care will be taken regardless of liability law.[9] If the victims could exercise such care, they would naturally do so because there would be a net benefit for them. If it is the injurers who could take care, the victims would pay the injurers to use care. This approach is supported by the "Coase Theorem."[10] For example, if only a carrier can prevent cargo loss by taking care or can do so at a lesser cost than that of a shipper, the shipper would pay the carrier to take precautions if the default rule is that losses lie where they fall. On the other hand, when only the shipper can prevent the loss or its cost of doing so is less, it will take the necessary preventive measures. Even if the default rule is changed to the shipper's favour by shifting responsibility for any loss of or damage to the cargo from the shipper to the carrier, the carrier will pay the shipper to take care. Similar transactions would occur in other areas of maritime liability law including liability for oil pollution, or personal injury and death aboard a ship; the party who could eliminate or reduce the loss or could do so at a lesser cost would take care regardless of liability law. By our assumption, the parties know who between them is the "cheaper cost avoider" and they can reach mutually beneficial agreements without any transaction cost. As there would be no need for liability law in such a world, the question of liability insurance would not even arise.

2. *There would be both liability law and liability insurance in the real world*

In the real world, there would arise the need for both liability law and liability insurance due to the lack of information and cost of transaction.[11] For example, prior to an oil pollution incident, there could not possibly be any transaction between a tanker owner and potential victims of oil pollution because of the lack of and/or cost of information to identify each other. Even if they are able to identify each other, they may not engage in

8. See R.A. Coase, "The Problem of Social Cost" (1960) 3 J. L. & Econ. 1 [Coase, "The Problem of Social Cost"]. An optimal care may also demand the reduction of activity level, when due to "diminishing marginal utility" the benefit from an additional activity becomes less than its social cost. Courts, however, rarely count activity level in determining due care. I will, therefore, limit the scope of care to the way in which an activity is conducted and not its level. See Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 193-98.

9. For simplicity of analysis, I assume here that optimal care occurs when care is taken only by that party who can prevent or reduce the loss at cheaper cost. There are situations where optimal care would require both parties to take care at the same time. For discussion on unilateral and bilateral care situations, see Steven Shavell, *Economic Analysis of Accident Law* (Cambridge: Harvard University Press, 1987) at 9-18 [Shavell, *Economic Analysis of Accident Law*].

10. Coase, "The Problem of Social Cost," *supra* note 8.

11. See generally Calabresi, *The Costs of Accidents*, *supra* note 7 at 135-38.

a negotiation because of the prohibitively high cost of doing so.[12] In the highly unlikely event of negotiation, the negotiation may not result in an agreement on the possible cost of care and on who should bear such cost because of the problems of "hold-out," "free-loading,"[13] and 'free-riding'.[14] In some situations such as in contracts of carriage,[15] the parties know each other, they negotiate, and reach agreements about the transportation of goods. Yet they may still fail to arrive at an agreement on taking optimal care because either they may have different views on the cost of care (information asymmetry) or, even if their views are similar, one party may not pay the other for taking care due to the inability of the former to observe and verify the care taken by the latter. These shortcomings of market transactions or of information asymmetry may be overcome by imposing legal liability on the party who could take optimal care.[16]

In the ideal situation, mere existence of liability rule should suffice to induce optimal care because an optimal care implies that the cost of care is less than the benefit from preventing or reducing the loss or liability. However, the benefit in the form of complete prevention or partial reduction of loss/liability is not usually a definite figure but a "probability-discounted" or an expected amount.[17] The cost of care, on the other hand, is certain. A potentially liable party would take care if and only if it thinks, or better yet, knows that the expected benefit from its care is high enough as to justify the sure cost of care. For example, if the party knows that taking care at a cost of $100 would reduce the likelihood of a loss of $1,000

12. Such cost includes time and efforts and would likely to outweigh the possible benefit. See Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 87-89.

13. Both the 'hold-out' (i.e., asking more than reasonable price) and "free-loading" (offering less than reasonable price) problems arise in a "bilateral monopoly" situation, i.e., when the parties (e.g., the polluters and victims of pollution) have no other option but to negotiate only with each other in order to arrive at their desired agreement. See Guido Calabresi & A. Douglas Melamed, "Property Rules, Liability Rules, and Inalienability: One View of the Cathedral" (1972) 85 Harv. L. Rev. 1089 at 1106; Calabresi, *The Costs of Accidents*, *supra* note 7 at 137, n. 4; Shavell, *Foundations of Economic Analysis*, *ibid.* at 91-92.

14. I.e., benefiting from the negotiation of others without personally participating and incurring the cost. This mainly occurs when the number of plaintiffs/defendants is large and the individual benefit from such negotiation is small. Shavell, *Foundations of Economic Analysis*, *ibid.* at 88.

15. Lack of due care, or negligence (a tort) can occur in many contractual situations, such as employment contract, contract to buy foods or to receive medical treatment etc. See Richard A. Posner, *Economic Analysis of Law*, 6th ed. (New York: Aspen Publishers, 2003) at 171-72 [Posner, *Economic Analysis of Law*].

16. Coase, "The Problem of Social Cost," *supra* note 8 at 15-16. Besides liability, there are other legal rules such as regulations, corrective tax, and subsidy to address the market's failure to arrive at mutually beneficial agreement. For various legal rules and their comparative strengths see Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 92-101; Calabresi, *The Costs of Accidents*, *supra* note 7 at ch. 5 and 6.

17. Shavell, *Foundations of Economic Analysis*, *ibid.* at 177-178.

by 20 percent (say, from 50 to 30 percent), it would take care because the expected benefit in the form of reduction of loss/liability would be $200 (20 percent reduction multiplied by $1,000). As the cost of care in this example is less than the gain in terms of expected liability, taking care here is cost-efficient. Failure to take care in such a situation would amount to negligence.[18] In other words, negligence occurs in the failure of a defendant to take reasonable precautions when the cost of doing so is less than the cost of accident, discounted by the probability of its happening.[19] Being a rational individual, a potentially liable person would take care and, consequently, there would not be any actual imposition of liability.[20] As we will see shortly in Part II, courts may err in their determination of expected loss and optimal care. As a result, there would be both liability and liability insurance in the real world.

3. *Presence of actual liability indicates failure of liability law to induce optimal care*

In a negligence-based liability setting, the fact that a party is liable means it breached its duty of care, i.e., it did not take reasonable care.[21] When a party does not exercise reasonable care despite the presence of liability law, liability law has failed to create incentives in the mind of that party. The failure of the liability system to create incentives may occur due to the possibility of escape by a potential liable party from liability for some

18. In *United States v. Carroll Towing Co.*, 159 F.2d 169 at 173 (2d Cir. 1947), Judge Learned Hand held that not taking care amounts to negligence when B < PL where B is the cost of precaution, P probability and L magnitude of loss. In economic analysis of law literature this is known as "Hand Formula." See Posner, *Economic Analysis of Law*, *supra* note 15 at 168.

19. Although courts do not calculate the cost of optimal care and the expected liability in mathematical terms, most of the time courts' rulings on negligence will roughly approximate such calculation. Courts' determination of reasonable care in negligence settings will vary with cost of care and the risk of harm arising from the lack of care. The greater the harm or the higher its likelihood, the higher would be the standard of reasonable care. For example, in a narrow channel where the probability of accident is high, the standard of reasonable care would be correspondingly high. Care in such a situation includes reducing speed (slow navigation means more time to transport goods, which translates into more cost for a carrier), and employing local pilots (thus incurring the pilotage fees). See *The Alletta*, [1965] 2 Lloyd's Rep. 479 (where a master's failure to use the service of a pilot caused an accident; the master was held negligent, even though pilotage was not compulsory); see also Posner, *Economic Analysis of Law, ibid.* at 169-170.

20. See Guido Calabresi & Jon T. Hirschoff, "Toward a Test for Strict Liability in Torts" (1972) 81 Yale L. J. 1055 at 1058 [Calabresi & Hirschoff, "Test for Strict Liability"].

21. This assumes that courts or jurors are not erring in holding the party liable despite its exercise of reasonable care.

obvious reasons.[22] A not-so obvious reason is underestimation by the courts of expected loss from negligent conducts due to the courts' possible lack of information on magnitude and probability of loss and the cost of care. As a result, "due care" determined by the courts may fall below the optimal care level. In this regard, an insurer will naturally have superior information and will do better than the courts to determine and induce optimal care against the expected loss. The detailed explanation of this point will be made below in section A of the next part.

II. *Why liability insurance may lead to better care*

1. *Insurers possess superior information on optimal care*

The simple reason why insurers can motivate potentially liability parties to take better care is that the insurers are likely to know better than the courts when taking care is economically efficient because of the insurers' natural informational advantage on the activities they insure. Information is the key to the determination of optimal care. In order to determine optimal care, three pieces of information are needed: the magnitude of a loss, its probability, and the cost of care.[23] Insurers' knowledge on all three pieces of information is likely to be superior to that of the courts. In our previous example, we knew that the cost of care ($100) was optimal because of our information on the magnitude of loss ($1,000) and its probability both before care (50%) and after care (30%). Misinformation on any of these three aspects may affect the determination of optimal care and lead to suboptimal care.

a. *Information on the magnitude*

Information on the magnitude of a loss may be easy to determine when the number of victims is small and when the loss manifests itself within a short period of time from negligent conduct. Yet on some occasions the number of victims may be large and the loss may occur over a span of few years. An example of this nature in the maritime context can be an incident of oil spill from a tanker. The victims of a large scale oil spill may be many

22. Such reasons include a) inability of the victim to detect the negligent person, b) courts' error in holding a negligent person not liable, c) victims' costs of litigation, which may not make it worthwhile for them to pursue the litigation, and d) inability of a liable party to pay the liability judgment (or the ability to shield assets against liability). Each possibility of escape makes the expected liability less than the actual loss arising from negligence and lower expected liability may induce the potential liable party not to expend on optimal care. See Shavell, *Foundations of Economic Analysis, supra* note 6 at 217-18, 224-32, 275, 387-401; Shavell, *Economic Analysis of Accident Law, supra* note 9 at 167-169.

23. See the "Hand Formula" mentioned *supra* note 18. See also Calabresi & Hirschoff, "Test for Strict Liability," *supra* note 20 at 1056-57; Shavell, *Foundations of Economic Analysis, supra* note 6 at 188-89.

and may suffer long term health problems, and financial consequences. All the victims may not appear before the same court or/and at the same time. As a result, it may be difficult for a particular court to determine the actual magnitude of the loss and the court will likely underestimate it because of the separate appearance of the claimants in different courts.[24] Underestimation of the magnitude of loss will influence the determination by the court of optimal care to prevent the loss. The court will determine "due care" below its optimal level; and losses, which could have been prevented by optimal care but not by the court-determined "due care," would continue to occur.

Optimal care is a relative term and depends on expected loss,[25] which is arrived at by multiplying the magnitude and probability of a loss. Small expected losses require little spending on precaution, while precaution against potentially large losses may justify significant expenditure. In contrast with the courts' information, a liability insurer will know the actual magnitude of the insured's liability more accurately as the insurer has to pay for the losses of all the victims whether they bring their claims jointly or separately, simultaneously or consecutively.[26] With more accurate information on the magnitude of the liability, an insurer would be in a better position to determine the optimal care level against future liability.

b. *Information on the probability of loss*

As for the probability of a loss, it is more problematic to determine. Negligent conduct such as high speed in a narrow sea-lane or defective radar on a ship may result in a collision on one occasion and may cause no harm on another. When a loss occurs and a plaintiff brings an action, the court may consider the probability of a loss in terms of its foreseeability. If

24. Courts may sometimes overestimate the loss and set the due care level above optimal care. Setting the due care level higher than optimal care may lead to excessive care. Although excessive care amounts to social waste, courts' overestimation of possible loss will be very rare if we consider the total social loss from negligence, and not just the loss of immediate victims. See the following note.

25. For analytical convenience, I limited the expected loss from negligent conduct to the pecuniary and direct loss suffered by victims. For a thorough analysis, expected loss needs to include non-pecuniary loss as well as the administrative costs of the liability system which would not have incurred but for the negligent conducts. See Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 269-275, 284-85.

26. Negligent conduct with long term liability implications (e.g., negligent handling of toxic substances) brings about uncertainty for insurers as to the actual liability payment over the years. Insurers sometimes overcome such uncertainty by using "claim-made policy" instead of "occurrence policy." In a claim-made policy, insurers are liable only for claims filed during the policy year as opposed to claims made after the policy year for losses arising from negligent conduct in the policy year. However, in a claim-made policy the insurer lacks motivation to determine total expected liability from the negligent conduct and to devise optimal precautionary steps against such liability. See Abraham, *Distributing Risk*, *supra* note 3 at 49-51.

the loss is a reasonably foreseeable consequence of the negligent conduct,[27] liability will be imposed. Once liability is imposed, the courts do not increase or reduce the liability based on actual probability of the loss. For example, if the loss is $1,000, liability will be $1,000 regardless of whether the probability of its occurrence from negligent conduct is 20 percent or 80 percent. This will not cause any distortion of incentives if the negligent party has to account for the loss every time there is a loss arising from its lack of care. In this way its expected liability will equal the expected loss and it will take care whenever the cost of care in preventing the loss is less than the expected liability.[28] However, for various reasons a negligent party may escape liability despite the occurrence of a loss from its negligence.[29] As a result, its expected liability will be less than the expected loss caused by its negligent conduct. For instance, if the negligent conduct gives rise to two accidents with $1,000 loss on each occasion but the defendant is held liable only on one occasion, its actual liability would be $1,000 despite the actual loss from the negligence being $2,000.[30] In order to maintain proper incentives, its liability has to be $2,000 when it is sued and held liable. Yet the courts never impose liability more than the actual loss of the victims except in cases of punitive or exemplary damages. Thus the imposition of liability by courts will not reflect the actual probability of loss from negligence.

Theoretically there is no reason for a liability insurer to charge a prospective insured a premium higher than what would be the insured's expected liability. If an insured escapes liability 50 percent time, its insurance premium should also be 50 percent less than what it would be if it were found liable in every incident of loss arising from its negligence. However, in practice the premium is set ex-ante the actual losses, while liability is imposed ex-post the actual losses. Consequently, a liability insurer will rarely know the exact likelihood of courts' imposition of liability on its insured. Also, it would be in the insurer's best interest if the insured is never held liable. These two factors (insurer's uncertainty about

27. When a loss is *not* reasonably foreseeable, its probability may be very low so as not to justify the cost of care, which includes the cost of obtaining information about the risk. See Posner, *Economic Analysis of Law*, *supra* note 15 at 186-87. Even if prevention or reduction of such loss is cost-justified, not holding parties liable for such loss may not have any detrimental effect on incentives to take care because a potentially liable person would likely to overlook the possibility of such unforeseeable loss. See Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 238-39.

28. Shavell, *Foundations of Economic Analysis*, *ibid.* at 87-89, 236-37, 240.

29. See *supra* note 22.

30. Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 244. Although a negligent party's liability above the actual loss of the plaintiff in such a case will exceed the plaintiff's optimal compensation, the additional liability may be imposed through fines, which would go to the state and not to the plaintiff. *Ibid.* at 272-75.

the insured's actual liability and the insurer's natural desire of never having to pay for liability) combined would make the insurer want its insured to take any precautionary step that was economically efficient.[31] In order to determine what precaution is economically efficient, the insurer's standard would be expected loss, not simply the expected liability as determined by allowing for the likelihood of escape. This level of care would also exonerate a defendant insured from any liability for negligence and its liability insurer would have nothing to indemnify unless there is error by the court or the liability is strict.[32]

This simple analysis shows that the liability insurance would produce better incentives in a potentially liable person than the liability law alone. To summarize the point, in assessing liability courts fail to take into account the actual probability of losses from negligent conduct and thus render the expected liability lower than the expected loss. This will in turn affect the determination of optimal care because, as mentioned earlier, optimal care is a relative term and depends on the expected loss. Courts' determination of "due care" would be less than optimal care and there would continue to occur some losses which optimal care would have prevented.[33] On the other hand, an insurer would encourage its insureds to take optimal care because the insurer's determination of such care would likely be based on the expected loss as opposed to mere expected liability.

31. In the case of uncertainty about due care level or liability, a party may take more care than is efficient in light of expected liability. An insured party may not do so due to the moral hazard problem. However, there are insurance mechanisms, as discussed *infra* part II.3, to check moral hazard. See generally Shavell, *Foundations of Economic Analysis*, *ibid.* at 224-27.

32. These two factors may explain why a shipowner would be afraid of liability and consequently would buy liability insurance, even when it takes every possible care or when no care is economically cost-efficient. See Posner, *Economic Analysis of Law*, *supra* note 15 at 171; Shavell, *Foundations of Economic Analysis*, *ibid.* at 229-30. Theoretically, in the case of both negligence and strict liability laws, an insurer could not motivate the insured to exercise more care than what is efficient. By definition, any care above its efficient level would entail more cost than the benefit in reduction of loss or liability. The insured would be financially better off not to exercise such high level of care even if it is held liable for the loss, as would be the case under strict liability, and even if the premium increase will follow to reflect the burden of strict liability. The increased expected liability and the resulting premium increase would be less than the cost of care to eliminate such liability. However, in practice strict liability would likely lead the insured to take more care than what it would take under negligence rule or even more than optimal care because the fear of uncertain future liability or premium increase may weigh more in the minds of both the insurer and the insured than the inconvenience of additional cost of care in the present. A different reason why strict liability may lead a potentially liable person to more than efficient care exists when the plaintiff could prevent the same loss at a lesser cost, even though the cost of care incurred by both the plaintiff and the defendant is less than the expected loss/liability. See Shavell, *Economic Analysis of Accident Law*, *supra* note 9 at 9-18.

33. See Shavell, *Foundations of Economic Analysis*, *ibid.* at 228-29.

c. *Information on the cost of care*

As for the cost of care, again insurers are in a better position than the courts to assess such cost. This is simply because insurers have the expertise and technical knowledge on the subject matter they insure. They would usually have superior knowledge than the courts on how much it would cost, for instance, to employ an additional crew member or to fit a ship with the latest fire-fighting technology.[34] With the better knowledge on the cost of care, the magnitude and the probability of a loss, insurers can analyse whether a precautionary measure is cost-efficient or not. A measure is efficient if and only if the cost of care is less than the expected loss.[35] Failure to take care in such case amounts to negligence.[36] Once an insurer determines what precautions are optimal, it can then use various insurance mechanisms such as rate variance, policy exception, policy limit, deductible, etc. to ensure that the actual care taken by the insured corresponds to optimal care.

2. *Various legal principles strengthen insurers' informational advantage*

In addition to their natural informational advantage, insurers can obtain any special or peculiar information about the insured subject matter or about the individual insured with the aid of various legal principles. The more an insurer knows about the idiosyncratic features of the insured ship and the personality of the individual insured, the better the insurer can determine the probability and magnitude of losses and consequently the cost of optimal care. Two principles of insurance law can be very effective in this regard: the duty of disclosure and insurance warranty.

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34. As most insurance disputes in fact arise between insurers (e.g., a liability insurer defending a liability claim against its insured shipowner) and/or insurance-like entities such as the Ship-Source Oil Pollution Fund (SSOPF) or the International Oil Pollution Compensation Fund (IOPCF) trying to recoup the compensation they have paid to the victims of oil pollution, courts incidentally benefit from the expertise and experience of these insurers and insurance-like institutions. It is true that the presence and assistance of these experts will reduce the courts' information disadvantage as compared to that of insurers, thus helping the courts to determine the expected loss and optimal care level more accurately. In addition, judges dealing with marine insurance matters are more likely than not to be among the judges experienced in maritime matters. Still the insurer of a particular ship is likely to know better about the specific care aspects of the insured ship than the experts, who may also be insurers but not the insurers of the same ship under the proceedings, and the judges, who may be very knowledgeable about marine insurance matters but are not likely to be more aware than the ship's insurer about its special features.

35. To be exact, this would be the case when taking proper precautions will completely eliminate the loss. If taking precautions only reduces the magnitude or probability of the loss, then cost is optimal if it is less than the difference between the expected loss before and after taking the precautions.

36. See the "Hand Formula," *supra* note 18.

a. *Duty to disclose material facts*

An insured is required to disclose before the formation of an insurance contract any material circumstance which would influence the insurer's decision either in taking the risk or in fixing the amount of premium.[37] The consequence of the breach of this duty is the avoidance of an insurance contract regardless of any causal connection between the breach and a subsequent loss.[38] This duty is based on the notion that marine insurance is a contract of utmost good faith (*uberrimae fidei*). As a result, a prospective insurer is required not only to avoid misinforming any fact requested by the insurer, as is the case under the general law of contract (i.e., the law of misrepresentation), but also to disclose voluntarily any relevant material circumstances the insured knows or ought to know.[39] The rationale behind this requirement lies in the fact that a prospective insured will usually have better information on any special or unusual facts about the insured subject matter.[40]

37. See *Marine Insurance Act*, S.C. 1993, c.22, s. 21(1) [*MIA*]; *Marine Insurance Act*, 1906 (U.K.), 6 Edw VII, c. 41, s. 18(1) [*UK-MIA*]. See also the House of Lords' decision on the meaning of "material fact" and "inducement" in *Pan Atlantic Insurance Co. Ltd. v. Pine Top Insurance Co. Ltd.*, [1994] 3 All E.R. 581, 2 Ll. L. Rep. 427 (H.L.), where the court applied an objective test to determine "materiality" but a subjective test to decide "inducement." The decision partially overruled the English Court of Appeal's decision in *Container Transport International Inc. v. Oceanus Mutual Underwriting Association*, [1984] 1 Ll. L.R. 476, 1984 WL 281688 (C.A.), where an objective test was applied for both "materiality" and "inducement." In Canada the Ontario case *Nuvo Electronics Inc. v. London Assurance* (2000), 49 O.R. (3d) 374, 19 C.C.L.I. (3d) 195 (S.C.J.) discussed the above House of Lords decision but did not follow the House of Lords' definition of "materiality."

38. *Henwood v. Prudential Insurance Company of America*, [1967] S.C.R. 720, 64 D.L,R. (2d) 715 (where the insured died in an automobile accident and the policy was avoided because of the insured's failure to disclose the fact that he was suffering from clinical depression).

39. *MIA*, *supra* note 37 at s. 20; *UK-MIA*, *supra* note 37 at s. 17. See *Carter v. Boehm*, (1766) 3 Burr. 1905 at 1909, 97 E.R. 1162 [*Carter*, cited to Burr.]. Here, Lord Mansfield states, "Good faith forbids either party, by concealing what he privately knows, to draw the other party into the bargain owing to his ignorance of that fact, and believing the contrary." As for the connection between the duty of disclosure (*MIA*, *supra* note 37 at s. 21(1)); *UK-MIA*, *supra* note 37 at s. 18(1)) and the doctrine of utmost good faith (*MIA*, *ibid.* at s. 20; *UK-MIA*, *ibid.* at s.17), see Howard Bennett, *The Law of Marine Insurance*, 2d ed. (Oxford: Oxford University Press, 2006) at 102-103, 158 [Bennett, *The Law of Marine Insurance*]; see also *Coronation Insurance Co. v. Taku Air Transport Ltd.*, [1991] 3 S.C.R. 622, [1992] 1 W.W.R. 217 at 228. The doctrine of utmost good faith may, of course, apply to all stages of an insurance contract and is much broader than the duty of disclosure, which is relevant mainly at the contract pre-formation stage. However, as the sole statutory remedy of the breach of good faith in the form of contract avoidance may cause severe hardship for the insured, especially when the breach is discovered *only after* the occurrence of an insured peril, courts tend to limit the application of the doctrine only to the contract pre-formation stage. *Ibid.* at 175-180.

40. *Carter*, *ibid.* at 1909. Here, Lord Mansfield states, "Insurance is a contract upon speculation. The special facts, upon which the contingent chance is to be computed, lie most commonly in the knowledge of the insured only: the underwriter trusts to his representation, and proceeds upon confidence that he does not keep back any circumstance in his knowledge, to mislead the underwriter into a belief that the circumstance does not exist, and to induce him to estimate the risque, as if it did not exist." See also Bennett, *The Law of Marine Insurance*, *ibid.* at 100-108.

This legal requirement and the severe consequences flowing from its breach help an insurer to know the strengths and weaknesses of a particular insured ship. This information in turn facilitates the determination of the expected loss from the particular ship. The key to the inducement of optimal care is the ability of an insurer to set the premium reflecting as closely as possible the amount of expected loss from each individual insured.[41] If a premium is set at a rate less than the expected loss, an insured may over-invest in insurance and under-invest in loss prevention.[42] If it is higher than expected loss, the opposite may occur, i.e., prospective insureds will over-invest in risk prevention and under-invest in insurance.[43] Neither is efficient. The first situation is inefficient because it will perpetuate the problem of moral hazard as it would be cheaper to insure than to take preventive measures. The second situation is undesirable for it causes a risk-averse individual to take excessive precaution, i.e., the cost of care is more than the expected loss.[44]

The cost of information or lack of it is the main obstacle to set the premium rate to mirror the expected loss or liability of each individual insured.[45] Duty to disclose material facts not only facilitates the obtaining of necessary information but also reduces the cost of information by requiring an insured to disclose those facts which are likely to be within the insured's knowledge or which the insured could obtain at a cheaper cost. This also makes economic sense. On the other hand, when the insurer could obtain some information more easily or with lesser cost, there is no justification in imposing on the insured this duty of disclosure for such information and the law rightly and roughly limits the duty at that point.[46]

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41. For example, suppose the expected loss before any care is $2,000, out of which $1,000 cannot be eliminated by optimal care either because it is purely accidental or because taking care is not cost-efficient. If the other $1,000 can be eliminated by taking care at $500, setting the premium at $2,000 for an insured who does not spend $500 on care to reflect its expected loss, and reducing the premium to $1,000 for another insured who spends $500 on care to reflect the latter's expected loss would lead the former to take care at a cost of $500. For the connection between expected loss and premium, see Abraham, *Distributing Risk, supra* note 3 at 2.

42. *Ibid.* at 15. For instance, if insurance premium in the above note is set at $1,200 regardless of care, the first insured would not invest $500 on care and the second insured would pay $1,200 in premiums instead of $1,000 and would spend nothing on care.

43. I.e., the premium in the above example in note 41 is set at more than $2,000.

44. The very purpose of insurance is to reduce the problem of risk aversion so that risk-averse people do not take excessive caution (i.e., over-invest in risk-prevention). If insurance itself is the source risk aversion, it fails in its purpose. For the definition and effect of risk aversion see part II.4.a, *infra*.

45. See generally Abraham, *Distributing Risk, supra* note 3 at 67-69.

46. See *MIA, supra* note 37 at ss. 21(5)(b)-(c); *Canadian Indemnity Co. v. Canadian Johns-Mansville Co.*, [1990] 2 S.C.R. 549, 72 D.L.R. (4th) 478; *Coronation Insurance Co. v. Taku Air Transport Ltd*, [1991] 3 S.C.R. 622, [1992] 1 W.W.R. 217.

Material facts with regard to insurance of a ship include its loss history,[47] age,[48] flag,[49] value,[50] required certification,[51] criminal allegations against its owners or crew,[52] any unusual structural feature, etc. All this information gives an insurer a better idea about the seaworthiness of the insured ship or the expected loss from its operation as well as about the standard of care by the shipowner and crew or their tendency of moral hazard. The insurer can then use various insurance mechanisms to make sure that the insured improves its care level. The insurer can also recommend structural changes on the insured ship based on the acquired information.

b. *Insurance Warranties*

Proper assessment of risk or expected loss may require that an insurer have more information than those falling under the legal test of "material circumstance,"the disclosure of which is already required by law. Some other information, though not material under the legal test of "materiality," may help an insurer to assess further about the expected loss or liability of a particular ship. For example, information on the number of crew members or fire-fighting system onboard may be useful in determining the likelihood of losses due to these factors. In order to ensure all the information sought and obtained is true, the insurer may include in the insurance application that every fact stated there is warranted to be true to the best of the applicant's knowledge whether material or not.[53]

Besides the truth of an existing fact, a warranty can also be used for a future fact, i.e., for making sure that an insured takes the desired precautionary steps in the future.[54] The position of a warranty in insurance

47. *Neepawa Yacht Ltd. v. Laurentian P & C Insurance Co.* (1994), [1995] B.C.W.L.D. 931, 1994 CarswellBC 3080 (S.C.); *Laurentian Pacific Insurance Co. v. Halama* (1991), 7 C.C.L.I. (2d) 84, 60 B.C.L.R. (2d) 190 (S.C.).

48. *Nova Scotia Marine Insurance Co. v. Stevenson* (1894), 23 S.C.R. 137, rev'g. (1893), 25 N.S.R. 210 (C.A.).

49. See *Seaman v. West* (1885), Cout. Cas. 723, Cassels S.C. 388 (S.C.C.), aff'g (1884), 17 N.S.R. 207 (C.A.).

50. *Fudge v. Charter Marine Insurance Co* (1992), 8 C.C.L.I. (2d) 252, 97 Nfld. & P.E.I.R. 91 (Nfld. S.C.T.D.).

51. *Atlantic Freighting Co. v. Provincial Insurance Co. Ltd.* (1956), 5 D.L.R. (2d) 164 (N.S.S.C.).

52. *North Star Shipping Ltd. v. Sphere Drake Insurance Plc*, [2006] 2 All ER (Comm) 65, [2006] 2 Lloyd's Rep 183 (C.A.).

53. See, for example, the "basis clause" in rule 6(2) of the Britannia P&I rules; cited in Bennett, *The Law of Marine Insurance*, *supra* note 39 at 181.

54. *MIA*, *supra* note 37 at s. 32(1)(a)-(b). For example, in *Shearwater Marine Ltd. v. Guardian Insurance Co of Canada* (1998), 60 B.C.L.R. (3d) 37 (C.A.), aff'g. (1997), 29 B.C.L.R. (3d) 13 (S.C.), the insurance contract contained a warranty in the following wordings, "Warranted ... Vessel inspected daily basis and pumped as necessary." See also *DeGroot v. J.T. O'Bryan & Co* (1979), 15 B.C.L.R. 271 at 281 (C.A.) as to the need of (promissory) warranty for certainty in future facts/obligations. See also George R. Strathy & George C. Moore, *The Law and Practice of Marine Insurance in Canada* (Markham: Butterworths, 2003) at 43 and 72-73 [Strathy & Moore, *Marine Insurance in Canada*].

law is similar to that of a condition precedent in general contract law[55]; breach of a warranty discharges an insurer from any prospective obligation for insured loss or liability. Since the refusal of coverage following the breach of warranty does not require any causal connection between the breach and the subsequent loss,[56] the warranty makes an insured act in respect to the warranted precautionary steps as if it had no insurance.

It is noteworthy that although insurers may gather most of the relevant information from the insured by virtue of the legal duty to disclose material facts and through various insurance warranties, no insurer bases its risk assessment entirely on the information provided by the prospective insured. Insurers will invariably use their own surveyors and rely on the survey reports prepared by the ship's classification society to further inform themselves in order to assess the risk more accurately.

3. *Various insurance mechanisms create stronger financial incentives*

For the purpose of loss reduction, it is not enough for insurers to have better information on expected liability and optimal care. Ultimately, it is the insureds who have to take the actual care. Thus, there is a need to devise some ways to motivate potentially liable insureds to take optimal care. Both the courts, through liability law, and the insurers through various insurance mechanisms, try to address this need. It will be shown in this section that through the financial incentives of the insurance mechanisms insurers can address this need better than the courts can with the liability law alone. The insurance mechanisms mainly revolve around premium rates and coverage restrictions. With the threat of premium increase and coverage reduction and/or exclusion, they deter an insured from negligence and carelessness. Although some mechanisms on their separate analysis

55. See *Elkhorn Development Ltd. v. Sovereign General Insurance Co.* (2001), 87 B.C.L.R. (3d) 290, 26 C.C.L.I. (3d) 23 (C.A.), rev'g (2000), 18 C.C.L.I. (3d) 203, (B.C.S.C.).

56. *MIA*, *supra* note 37 at s. 39(1)-(2). See also *Beacon Life & Fire Assurance Co. v. Gibb* (1862), 1 Moo. P.C.N.S. 73 (P.C.). Because of this harsh consequence, courts in Canada are very reluctant to find breach of warranty unless both its wording and the breach are clear and unambiguous. See Strathy & Moore, *Marine Insurance in Canada, supra* note 54 at 132, 143-44. Courts have made a distinction between "warranty" and "suspensive condition" or "warranty delimiting the risk," Breach of the latter only suspends the coverage and a loss not causally connected to the breach is recoverable from the insurer. See *Century Insurance Co. of Canada v. Case Existological Laboratories Ltd,* [1983] 2 S.C.R. 47, 150 D.L.R. (3d), 2 C.C.L.I. 172, aff'g. (1982), 35 B.C.L.R. 364, 133 D.L.R. (3d) 727 (C.A.), rev'g. (1980), 116 D.L.R. (3d) 199 (B.C.S.C.); *Tulloch v. Canada (Department of Fisheries and Oceans)* (1988), 21 F.T.R. 72, 32 C.C.L.I. 36, aff'd. (1989), 96 N.R. 51, 37 C.C.L.I. 229 (F.C.A.); *Landmark Corp. v. Northumberland General Insurance Co.* (1984), 8 C.C.L.I. 118 (Ont. H.C.J.); *Federal Business Development Bank v. Commonwealth Insurance Co.* (1983), 2 C.C.L.I. 200 (B.C.S.C.). However, in order to avoid the uncertainty of courts' interpretation some insurers not only describe a condition as a warranty but also expressly mention forfeiture of the policy as the consequence of its breach. See clause 1 of the British Columbia Builders' Risks Clauses (1/1/89); cited in Strathy & Moore, *Marine Insurance in Canada, ibid.* at 137 note 4.

may appear less effective than the liability law in creating incentives, their joint use will generate stronger incentives than the use of liability law alone.

a. *Premium rate-variance*

As the imposition of liability can no longer directly deter a potentially liable party from negligence when it has insurance, the issue of incentives totally depends on various insurance mechanisms.[57] Premium rate variance on the basis of an insured's actual care and loss experience[58] is the most important insurance mechanism to induce optimal care.[59] Premium rate variance fills the vacuum in terms of incentives left by the availability of liability insurance.[60] By rewarding precautionary measures through premium reduction and by penalizing negligent practices through premium increase,[61] insurers play the role of the courts in creating incentives towards care.

More importantly, for our purpose, rate variance may create stronger financial motivation for an insured to take precautions for the following reasons. First, imposition of liability has financial implications only in the case at issue, while premium increase following a liability may have financial consequences for a long period to come.[62] Second, as the premium rate depends on actual precautionary steps before an incidence of a loss/ liability, financial reward for such steps is more immediate and certain in premium reduction than in the possibility of not being held liable. A dollar in the pocket has more value than a dollar in future expectation.

57. Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 257, 265-66.

58. While incentives through rate variance based on actual care (feature rating) depend on the insurer's ability to observe various aspects of care taken by the insured, such ability is not necessary to induce care in the case of rate variance on the basis loss history (experience rating). Experience rating, however, takes place after the occurrence of losses and may sometimes take years to be reflected in actual premiums, especially in maritime insurance. In other words, the shortcomings of one factor may be compensated for by the advantages of the other. See generally Abraham, *Distributing Risk*, *supra* note 3 at 71-73. See also Shavell, *Foundations of Economic Analysis*, *ibid.* at 262-63, 277 at n. 7.

59. Abraham, *Distributing Risk*, *ibid.* at 15.

60. As Prof. Atiyah puts it, "although the tortfeasor will not personally have to pay any damages awarded against him, his insurer will have to do so; and the insurer may visit his displeasure on the insured by *increasing his insurance premiums*." P.S. Atiyah, "Accident Prevention and Variable Premium Rates for Work-Connected Accidents" (1975) 4 Indus. L.J. 1 at 1 [emphasis added].

61. See the example given *supra* note 41.

62. See Edgar Gold, "Marine Pollution Liability After 'Exxon Valdez': The U.S. 'All-Or-Nothing Lottery!'" (1991) 22 J. Mar. L. & Com. 423 at 429: "Although it is sometimes suggested that this fairly extensive [marine] insurance coverage might contribute to a careless operational attitude, this is an erroneous view. Insurance rates are not calculated only on actuarial projections, but are also related to the loss record of a particular owner and/or vessel. Accordingly, even if the accident is fully covered by liability insurance today, the shipowner will be paying increased premiums tomorrow."

In the context of marine insurance, premium rate widely varies from ship to ship based on their physical structure and strength (seaworthiness) and their loss history. For example, in 1969 the premium for individual tanker owners varied from 3 cents to 150 cents per gross ton in the Norwegian Protection and Indemnity (P&I) club, SKULD.[63] It is noteworthy here that shipowners' mutual P& I clubs are the usual providers of marine liability insurance.[64] Both liability and hull insurers roughly assess the seaworthiness of a vessel from the reports of various surveys conducted by the insurers' own surveyors and those appointed by the vessel's classification society.[65] Maintaining the class and the membership in the same classification society are conditions precedent to the continuance of insurance coverage in both hull and liability insurance.[66] Even in open or floating cargo insurance, there is usually a "classification clause"[67] requiring the insured shipper to ship its goods on vessels of specified class and age.[68] As for the loss history, P&I clubs and hull insurers generally require the disclosure of claim records at least for the previous five years.[69] Unusual loss history—even beyond the time period specified by the insurers—if not very remote, may amount to a material fact and its disclosure by the insured would be mandated under the legal duty to disclose material facts.[70]

Combined with their superior knowledge on expected loss and optimal care, the insurers' ability to hold carrot and stick through rate variance based on vessels' seaworthiness and loss history alone would suffice to

63. LEG/CONF.2/C.1/WP. 3 (30 Nov. 1971) in *Official Records of the Conference on the Establishment of an International Compensation Fund for Oil Pollution Damage 1971* (IMCO, London: 1978) at 242.

64. Over 90 percent of the world's ocean-going tonnage is insured by the International Group of P&I clubs: Bennett, *The Law of Marine Insurance, supra* note 39 at 486; Mark Tilley, "The Origin and Development of the Mutual Shipowners' Protection & Indemnity Associations" (1986) 17 J. Mar. L & Com. 261. See also the Group's website at <http://www.igpandi.org> (last visited: August 6, 2007).

65. Historically, vessels were classed with different gradations based on an assessment of various factors, mainly bearing on the vessels' seaworthiness. Classification societies do not use such gradation today; a vessel is now either "in class" or not. Yet the initial and the periodic survey reports provide valuable information to vessels' insurers. See B.D. Daniel, "Potential Liability of Marine Classification Societies to Non-Contracting Parties" (2007) 19 U.S.F. Mar. L. J. 183 at 189.

66. Stephen Martin, "Marine Protection and Indemnity Insurance: Conduct, Intent, and Punitive Damages" (2003) 28 Tul. Mar. L.J. 45 at 48-49 [Martin, *Marine Protection*].

67. Institute Classification Clause 13/4/92; see Strathy & Moore, *Marine Insurance in Canada, supra* note 54 at 23 and 150. This clause indirectly leads a shipowner to better maintenance of its ship in order to attract business from cargo owners.

68. These clauses in insurance policies show the reliance marine insurers place on risk assessements by classification societies.

69. See *Laurentian Pacific Insurance Co. v. Halama* (1991), 7 C.C.L.I. (2d) 84, 60 B.C.L.R. (2d) 190 (S.C.); see also S. J. Hazelwood, *P. & I. Clubs: Law and Practice,* 3d ed. (London: LLP, 2000) at 115-16 [Hazelwood, *P. & I. Clubs*].

70. See *New Hampshire Insurance Co v. Oil Refineries Ltd,* [2002] 2 Lloyd's Rep 462; [2003] Lloyd's Rep IR 386 (C.A.).

put them in a better position than the courts to induce potentially liable shipowners to exercise due diligence. Yet an insurer would use additional mechanisms besides rate variance to maintain care. As mentioned earlier, some of these mechanisms may not on their separate application induce better care than the liability law alone. However, their joint use with rate variance would create incremental incentives for the insured to use care. Following are some of those mechanisms.

b. *Deductibles*

The ideal situation for maintaining proper incentives in the mind of an insured can be imagined if the insured could be made to act as if it were a "prudent uninsured," a phrase used in most of the P&I club rules.[71] An actual prudent uninsured would take reasonable care in every dimension whether courts can observe its care or not, if it has to directly pay for the liability of any loss arising from its activity regardless of the actual care.[72] This situation can only exist if the liability is strict and there is no liability insurance. However, imposition of strict liability and absence of liability insurance will have their own problems correspondingly in reducing incentives for victims to take care[73] and in discouraging people from investing in socially desirable activities[74]; discussion of these problems is beyond the scope of this paper. Yet with the availability of liability insurance in the context of negligence-based liability,[75] what an insurer can do to make the insured to act as a "prudent uninsured" is to reduce the coverage by various insurance mechanisms or to exclude it altogether in specific cases. Deductible is one of these mechanisms. Others include policy ceiling, franchise clause, uninsured warranty, and policy exceptions for certain risks where moral hazard is exceptionally

71. For example, see Rule 23B(i) in Martin, *Marine Protection*, *supra* note 66 at 50.

72. See Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 98-99 and 189.

73. This would only occur in bilateral care situations, i.e., where both the injurer and the victim can take care at the same time. See *supra* note 9. See also Shavell, *Foundations of Economic Analysis*, *ibid.* at 184-88.

74. See Shavell, *Foundations of Economic Analysis*, *ibid.* at 259-61.

75. As the reduction of incentives in negligence-based liability law is due mainly to the possible inability of the courts to observe or verify some aspects of care, the presence of insurance may improve the situation to the extent that insurers can observe or identify better than the courts those not-easily verifiable aspects of care. Although strict liability obviates the need for the courts to verify the actual care taken by a defendant, the presence of insurance in strict liability situation may bring back the problem of verification for the insurers when even the insurers cannot observe some aspects of care. However, as higher insurance payouts for strict liability will ultimately be reflected in premium rates, reduction of incentives due to the presence of insurance in strict liability situation may be minimal. As insurers will address the problem of moral hazard by adjusting premium rates regardless of liability rules, the analysis in this paper is equally applicable to both negligence and strict liability situations. See generally Shavell, *Foundations of Economic Analysis*, *ibid.* at 217-18.

serious. When insurance policies contain deductibles, the insureds remain uninsured for the amount of the deductibles. In maritime context, both P&I and hull insurance usually include deductible clauses and the amount of deductibles may vary from one loss or liability to another within the same policy.[76]

As the insureds have to directly bear any liability up to the deductible amount, they would have financial incentives to take care to prevent a liability-causing incident. However, the incentive effect of deductible would be diluted when liability is likely to exceed the amount of deductible by a large margin. A highly probable risk of large liability will justify strong precautionary steps to prevent or reduce the risk. Yet the cost of such precaution may exceed an insured's expected deductible. Other things being equal, an insured as a rational individual would not spend more than its expected deductible. Here, the effect of insurance payout above deductible on the incentives to take care is similar to that of limitation of liability principle, i.e., both reduce the expected liability amount and consequently the defendant's care level.[77] For example, with a 10 percent probability of $1,000 liability the expected liability is $100. If the deductible is $500, its expected value is only $50. A rational insured would not spend on care more than $50, while spending any amount up to $100 on care would be economically efficient.

As an insured bears the financial burden of deductible only when it incurs liability and only for a fraction of liability, the incentive effect of deductible cannot be either equal to or more than that of liability. The only exception would be when the cost of optimal care is below the expected deductible, i.e., $50 in our example.[78] However, even though the presence of deductible alone may not induce better care than the liability law, combined with rate variance and other insurance mechanisms deductible would lead to better incentives than the liability law alone. In other words, the shortcoming of deductibles in terms of incentives will be compensated

76. See International Hull Clauses (01/11/03), clause 15; Institute Time Clauses Hulls (1/10/83 and 1/11/95), cl 12; Hazelwood, *P. & I. Clubs*, *supra* note 69 at 259-260. Statistics on 119 major cargo claims paid by Gard, a Norwegian P&I club, show that there was about US$3.4 million in deductibles out of total US$60 million payouts. The study period was five years from 1996 to 2000. See *Claims Statistics* (Gard AS, 2005) at 4, online: <http://www.gard.no/iknowbase/Content/11991/Claims%20Statistics_low.pdf> [*Gard's Claims Statistics*].

77. For the effect of limitation of liability on incentives of liability law, see Muhammad M. Billah, "Economic Analysis of Limitation of Shipowners' Liability" (2007) 19 U.S.F. Mar. L. J. 297.

78. I.e., if $50 is what it takes to completely eliminate the risk or reduce it to an economically efficient level, then the deductible will induce optimal care. See generally Shavell, *Economic Analysis of Accident Law*, *supra* note 9 at 194-96.

for by the other insurance mechanisms. Liability ceiling is certainly one of those mechanisms.

c. *Liability ceiling or upward limit*

While deductible is a very useful tool in inducing care when the magnitude of liability is low, liability ceiling is a more effective means to achieve optimal care when the amount of liability is likely to be very high. Again, as an insured will bear the direct financial burden of liability above the ceiling, the higher the liability the greater would be the exposure to such financial burden and, consequently, the stronger the incentives to prevent or reduce the liability. In addition to maintain incentives, an insurer may impose a liability ceiling in order to limit its maximum exposure and to buy reinsurance against such exposure.

In the context of marine insurance, liability ceiling accompanied one of the earliest areas of liability insurance, that is, insurance for collision liability. Coverage for collision liability was and is still largely provided by hull insurers under a separate clause in the insurance policy, known as "Running-Down Clause."Before the introduction of this clause, the provision of insurance was mainly confined to property insurance in the form of coverage for accidental losses in ships and cargoes.[79] As this was among the first areas of liability insurance, insurers were understandably concerned with the effect of such insurance on an insured's incentives to care. In fact, this concern led the Lloyds' underwriters to petition, though unsuccessfully, to the British Board of Trade in 1854 to ban collision liability insurance.[80] Eventually, however, their concern translated into the imposition of a maximum limit on the coverage to three-fourths of the total liability.[81] This clause survives even today in modern hull clauses.[82] An interesting contrast here is the liability insurance coverage provided

79. See *Coronation Insurance Co. v. Taku Air Transport Ltd,* [1991] 3 S.C.R. 622, [1992] 1 W.W.R. 217, *per* Justice Cory at 229, "When Lord Mansfield set the principle governing insurance contracts the world was a little different. It was a simpler if not, in some respects, a gentler place. The business of insurance was very different. *The policies of insurance were issued most frequently to cover a vessel or its cargo.* The contract was issued for the benefit of the insured." [emphasis added]

80. William R.A. Birch Reynardson, "The History and Development of P&I Insurance: the British Scene" (1969) 43 Tul. L. Rev. 457 at 467.

81. The three-fourths of collision liability is actually in proportion to the insured value of the vessel. So, if the actual collision liability is more than the insured value of the vessel, the three-fourths of the actual liability would also exceed three-fourths collision liability coverage. However, the insured can buy supplementary cover for this excess under Institute Time Clauses-Hulls Excess Liabilities (1/11/95). See Bennett, *The Law of Marine Insurance, supra* note 39 at 400-401, n. 48.

82. See clause 6.1 of the International Hull Clauses (01/11/03). Similar restriction on hull insurance with regard to the value of the ship was legally imposed by the first codification of marine insurance laws in Barcelona in 1435: F. Martin, *The History of Lloyd's and of Marine Insurance in Great Britain,* (New York: Burt Franklin, 1876) at 25.

by the International Group of P&I clubs. The Group's coverage is virtually unlimited. Under an "overspill" pooling agreement and through four layers of reinsurance, the Group currently provides coverage up to $5.4 billion per liability incident.[83]

Although a policy limit would induce care, where liability is likely to exceed the ceiling, an insured's care level may still be less than optimal simply because its personal exposure to liability would be lower than the total amount of liability. The incentive effect of insurance ceiling suffers from the same shortcoming as that of deductible and limitation of liability principle. If there is a 10 percent chance of $100,000 liability, the expected liability would be $10,000. If the insurance ceiling is $70,000, the insured will personally shoulder the burden of $30,000 out of $100,000 liability and the expected value of this burden is only $3,000. In order to prevent the liability-causing incident, the insured may be willing to spend only up to $3,000. Yet optimal care may cost any amount up to $10,000, the amount representing the expected liability as opposed to the expected personal exposure from the liability ceiling.

For similar reasons as those in the case of deductible, a liability ceiling alone cannot logically create stronger incentives than liability law would do in the absence of insurance. However, if the cost of optimal care is less than the insured's expected personal exposure from liability ceiling alone or from the combined amount of liability ceiling and deductible, the insured would take such care. Another interesting point here is that an insured is certainly a risk-averse party.[84] A risk-averse party would be willing rather to spend more than an amount equivalent to its expected personal exposure than to bear the actual financial burden of deductible and liability ceiling.[85] In addition, the presence of liability ceiling does not mean that the underwriter is going to forgo their most effective tool, i.e., the rate variance.

d. *Franchise clause*

Some marine insurance policies may contain a franchise clause instead of a deductible clause. As in the case of deductibles, an insured remains personally responsible for any liability falling below the limit in the franchise clause. The insured thus has adequate incentives to prevent any incident which might give rise to liability below the franchise limit. As the

83. International Group of P&I Clubs, The Pooling Agreement, online: <http://www.igpandi.org/internal.php?primary_nav_selected=The+Group+Agreements&secondary=The+Pooling+Agreement > (last visited Apr. 11, 2007).

84. For the definition and effect of "risk-aversion" see II.4.a *infra*.

85. This is not excessive care as long as the cost does not exceed the total expected loss/liability, even though it is more than expected uninsured liability arising from deductible and franchise clauses.

effect of a franchise clause in this regard is similar to that of deductible, earlier comments on the comparison between deductible and liability law equally apply here. However, a franchise clause differs from a deductible clause when the liability exceeds the franchise limit; in such a case, insurers pay for the total amount of liability, including the amount falling below the limit in the franchise clause. Consequently, if potential liability is likely to exceed the franchise limit, an insured would have little incentive to prevent or reduce such liability because the insurer would have to pay not only the amount exceeding the franchise limit but also the amount falling below it. This feature of franchise clauses may even encourage the insured to intentionally inflate a loss so that liability for the loss exceeds the franchise limit and the entire burden falls on the insurer. Although this is a serious shortcoming of a franchise clause in terms of incentives to care, franchise clauses are not designed to maintain incentives. Rather their main purpose is administrative cost-saving in avoiding insurance payment for smaller claims falling below a certain threshold.[86] As an insurer is likely to use other insurance mechanisms alongside a franchise clause to address the problem of moral hazard, the administrative cost-saving from the franchise limit may outweigh its shortcoming in terms of incentives. In modern marine insurance, franchise clauses generally appear in the freight insurance and the amount is usually a percentage of the total freight insured.[87] Modern franchise clauses are the successors of "particular average" warranty (i.e., exclusion of partial loss) in old insurance policies.[88]

e. *Uninsured warranty*

While the above insurance mechanisms leave an insured not covered for a certain amount either below a threshold or above a ceiling, they do not forbid the insured from buying coverage elsewhere for the uncovered portion.[89] With regard to this portion, an insured has a choice either to obtain market insurance or remain self-insured. Purchase of coverage for

86. See Bennett, *The Law of Marine Insurance, supra* note 39 at 744-45. Although the deductible clause also has a similar advantage in reducing the administrative cost for small claims, it cannot be said that the saving of administrative cost is its main function because, if otherwise, there is no justification for deducting any amount when the loss or liability exceeds the deductible limit; the main function of the deductible must be the maintenance of some incentives to take care.

87. See Institute Time Clauses Freight (1/8/89 and 1/11/95), cl 12; Institute Voyage Clauses Freight (1/8/89 and 1/11/95), cl 10.

88. The word "warranty" here means "exclusion." For discussion and examples of particular average warranty, see Grant Gilmore & Charles L. Black Jr., *The Law of Admiralty*, 2d ed. (Mineola, NY: Foundation Press Inc., 1975) at 79-82 [Gilmore & Black].

89. For example, see clause 6.1 of the International Hull Clauses (01/11/03), providing three-fourths coverage for collision liability without any prohibition on obtaining coverage for the remaining one-fourth. In fact, optional clause 38 of the International Hull Clauses or P&I liability insurance provides coverage for this portion. See Bennett, *The Law of Marine Insurance, supra* note 39 at 398-99.

the uncovered portion from other insurers distorts the incentive effects of the above mechanisms. If the distortion is serious, insurers may include an uninsured warranty in the policy. Under an uninsured warranty, the insured is prohibited from buying coverage for certain risk or above a certain limit.[90] As mentioned earlier, an insurance warranty has the effect of a condition precedent in contract law and its breach renders the policy voidable. Any loss or liability following the breach does not fall on the insurer regardless of any causal connection between the breach and the loss or liability.

There were instances in marine insurance where a liability insurer not only left a certain portion of the risk uncovered but required the insured to retain that portion of the risk uninsured.[91] Although uninsured warranty is rare in modern policies,[92] there are still some restrictions on the maximum amount of coverage an insured can buy from the market for certain disbursements, managers' commissions, and for some types of freight.[93]

The comparative analysis of uninsured warranty with liability law in terms of incentives is similar to that of deductible, franchise limit, and liability ceiling. If the expected exposure to direct financial burden due to uninsured warranty is more than the cost of optimal care, the insured would have adequate incentives to take such care. If it is less, as will usually be the case, the incentive effect may suffer to the extent of the difference between optimal cost of care and expected personal burden of liability under uninsured warranty. In other words, the incentive effect of uninsured warranty is not additional to that of the above insurance mechanisms because an uninsured warranty does not directly reduce an insured's insurance coverage; it only ensures that underinsurance through deductible or policy limit is maintained so as to retain the incentive effects from those coverage restrictions.

90. See generally Bennett, *The Law of Marine Insurance, ibid.* at 545-48.

91. See *Muirhead v. Forth & North Sea Steamboat Mutual Insurance Association,* [1894] AC 72; cited *ibid.* A similar purpose can be achieved also through "no other insurance" warranty; see *Butler v. Merchants Marine Insurance Co.* (1885), Cass. Dig. 390 (S.C.C.).

92. Even though hull insurers may limit coverage to three-fourths for collision liability, they do not forbid the purchase of coverage for the remaining one-forth from other insurers. In fact, the insured usually buys coverage for this remaining portion either from the same hull insurer or from a P&I club. Bennett, *The Law of Marine Insurance, ibid.* at 400-401. As for other kinds of liability insurance, coverage is practically unlimited. See *supra* note 83 and accompanying text.

93. See Institute Time Clauses Hulls (1/10/83), cl 21.2; (1/11/95), cl 22.2; International Hull Clauses (01/11/03), cl 24.2; Institute Voyage Clauses Hull (1/11/95), cl. 20.2; cited in F. D. Rose, *Marine Insurance: Law and Practice*, (London: LLP, 2004) at 598, n. 139.

f. *Policy exceptions/exclusions*

Policy exceptions also restrict insurance coverage and make policy holders practically "prudent uninsured" for situations falling under the exceptions. In terms of incentive effect, policy exceptions are similar to liability law without liability insurance because in both situations a potentially liable party bears the full brunt of liability arising from its conduct giving rise to the liability. As an insured will have already paid the premium, the financial consequence flowing from a policy exception will actually be more severe. Policy exceptions will thus lead to better care at least in preventing the conducts which trigger the exceptions.

The most important exception from the perspective of incentives is that of any loss or liability "attributable to the wilful misconduct of the insured."[94] Although this exception is well established in common law and is enshrined in the marine insurance statutes,[95] it still appears in P&I club rules and in cargo insurance clauses.[96] The simple rationale behind this exception in property insurance (i.e., hull and cargo) is that an insured should not be allowed to profit from its own wrongdoing.[97] The most severe form of wilful misconduct in marine insurance context is scuttling.[98] Though it was a common insurance fraud in the past, it may still occur especially when a low freight market brings down the price of a ship much below its stated value in a valued policy.[99] A situation of scuttling may also give rise to cargo liability and thus may involve P&I clubs for liability insurance.

94. *MIA*, *supra* note 37 at 53(2); *UK-MIA*, *supra* note 37 at s. 55 (2).

95. *Ibid.*

96. For example, see Institute Cargo Clauses (A), (B), (C), cl 4.1; Institute War Clauses (Cargo), Strikes Clauses (Cargo), cl 3.1.

97. Wilful misconduct of the master and crew to the prejudice of the shipowner amounts to "barratry"; it is usually an insured peril and thus does not deprive the insured of the protection of coverage. See *O'Connor* v. *Merchants Marine Insurance Co.* (1889), 16 S.C.R. 331; *Spinney v. Ocean Mutual Marine Insurance Co.* (1890), 17 S.C.R. 326.

98. See *P. Samuel & Co. v. Dumas* (1924), 18 Ll. L. Rep. 211, [1924] All E.R. 66 (HL).

99. For a recent example, see *Boyda v. Saxbee Insurance Agencies (1975) Ltd.* (1984), 4 C.C.L.I. 26 (B.C.C.A.). Hull insurances are almost invariably valued policies. Under a valued policy, the value of subject-matter is conclusive evidence on valuation as between the insured and the insurer unless there is any fraud: see *MIA*, *supra* note 37 at s. 30 (4).

In contrast with wilful misconduct, mere negligence will not deprive an insured of the benefit of either hull or liability insurance.[100] Provision of insurance in cases of negligence may seem to condone and encourage negligent behaviours and may make the liability insurance appear inferior to liability law in terms of incentives. This is, however, not the case in reality. Although it is true that insurance provides protection against liability for negligence and may on the face reduce the incentive effect of liability law, there are various insurance and legal mechanisms, as we have already seen, to maintain the incentives in the minds of the insured to use care. Here the provision of insurance against liability for negligence can be compared with the vicarious liability of an employer for the negligence of its employees. In a vicarious liability situation, even though the negligent employees do not have to pay directly for their negligence, this may not in fact reduce the incentive effects of liability law because the employer can use the threat of firing or impose other less drastic monetary disciplines on the employees.[101]

Similarly, an insurer can prevent the negligent conduct of the insured by using financial disincentives through various insurance mechanisms even though the insurer pays for the liability arising from the insured's negligence. Also, when an employer has superior knowledge about the possible risk and precaution to that of its employees, vicarious liability may in fact lead to better care than if the employees directly bear the liability.[102] In a related manner, superior knowledge of the insurers brings the actual care closer to optimal care than would be the case in the absence of liability insurance.

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100. Some insurance policies provide coverage not only for the negligence of employee in the so-called "Inchmaree clause," but also for loss arising from the negligence of anyone including the shipowners and charterers. For negligence of employees see *MIA*, *supra* note 37 at s. 53 (1); *Century Insurance Co. of Canada v. Case Existological Laboratories Ltd,* [1983] 2 S.C.R. 47, 2 C.C.L.I. 172; *C.C.R. Fishing Ltd. v. British Reserve Insurance Co.*, [1990] 1 S.C.R. 814, 43 C.C.L.I. 1. For negligence of the insured, see *Russell v. Canadian General Insurance Co.* (1999), 11 C.C.L.I. (3d) 284 (Ont. Gen. Div.) and *Atwood v. Canada* (1985), 10 C.C.L.I. 62 (F.C.T.D.). In *Williams v. Canada* (1984), 7 C.C.L.I. 198 (F.C.T.D.) the court stated at 211, "In the absence of express stipulations to the contrary, *negligence on the part of the assured or of a person for whom he is or may be responsible* does not exempt the insurer from liability though the loss is caused thereby, for one of the main objects of insurance is to protect the assured against the consequences of negligence." [emphasis added]

101. Although an employer may legally sue the negligent employee to recover the money paid to a third party, employers rarely pursue this course of action. See James, "Accident Liability Reconsidered," *supra* note 1 at 557, n. 24.

102. See Alan O. Sykes, "The Economics of Vicarious Liability" (1984) 93 Yale L. J. 1231. See also Posner, *Economic Analysis of Law*, *supra* note 15 at 188-89; Shavell, *Foundations of Economic Analysis of Law*, *supra* note 6 at 233-36. See also Calabresi, *The Cost of Accidents*, *supra* note 7 at 164-165.

Some policy exceptions/exclusions are not really intended to induce care but to separate ordinary losses from the fortuitous ones. For example, losses or liability from ordinary wear and tear, from ordinary breakage and leakage, and from inherent vice or nature of the subject matter are not usually covered.[103] Some other exceptions may have as their reason the highly unpredictable or disproportionate risk such as exclusion of coverage for war and strikes. However, for all these exceptions alternative coverage may be available. As these exceptions have no role to play in creating incentives, their provision by alternative insurance is not socially undesirable and they are not relevant to our discussion here. However, when some conduct may likely be a cause of concern in care level such as the change of ownership/management, flag, and classification society of a vessel, in order to prevent such conduct insurers may designate them as exclusionary conduct for losses following such changes.[104]

g. *Duty to mitigate loss (to sue and labour)*

All the above insurance mechanisms mainly concern maintenance of incentives to take care at the pre-accident stage. Once an insured peril is either imminent or has already occurred, the insured can still take some additional care to avert or minimize the loss arising from the insured peril. In order to ensure that the insured take such care, marine insurance policies generally contain a "sue and labour" clause,[105] which imposes on the insured a duty to take reasonable steps to mitigate the loss or liability. Failure to comply with this obligation will deprive the insured of indemnity

103. See Institute Cargo Clauses (A), (B), (C), cl 4.2; War Clauses (Cargo) and Strikes Clauses (Cargo), cl 3.2; see also *MIA*, *supra* note 37 at s. 53 (2)(b); *UK-MIA*, *supra* note 37 at s. 55 (2)(c).

104. For example, the Canadian Board of Marine Underwriters (CBMU) Great Lakes Hull Clauses (Sept. 1, 1971) provide at lines 229-232, "In the event of any change, voluntary or otherwise, in the ownership or flag of the Vessel, or if the Vessel be placed under new management, or be chartered on a bareboat basis or requisitioned on that basis, or if the Classification Society of the Vessel or her class therein be changed, cancelled or withdrawn, then, unless the Underwriters agree thereto in writing, this Policy shall automatically terminate...". Canadian Hulls (Pacific) Clauses (Sept. 1/91) at lines 239-251, Institute Time Clauses Hulls (1/01/83) in cl 4, (1/11/95) in cl 5, and International Hull Clauses (1/11/03) in cl 14 contain similar provisions.

105. The words "sue and labour" were first used in the Lloyd's S.G. policy, which contained a clause requiring the insured "to sue, labour, and travel for, in and about the defence, safeguards, and recovery of the said goods and merchandises, and ship, &c, or any part thereof, without prejudice to this insurance...." [emphasis added]. Although the use of Lloyd's S.G. policy is now very rare, a clause to the same effect continues to exist in all modern hull and cargo policies as well as in policies for liability insurance. See the Great Lakes Hull Clauses (Sept. 1, 1971), the Canadian Hulls (Pacific) Clauses (Sept 1/91), Institute Time Clauses Hulls (1/10/83), cl 13.1; (1/11/95), cl 11.1; International Hull Clauses (01/11/03), cl 9.1; Institute Cargo Clauses (A), (B), and (C) (1/1/82), cl 16. See also Strathy & Moore, *Marine Insurance in Canada*, *supra* note 54 at 183-84.

for any loss or liability attributable to such failure.[106] Marine insurance statutes also impose this obligation.[107] As this is both an insurance and legal mechanism against moral hazard, there is no comparison between this mechanism and liability law; duty to mitigate is part of liability law. The insured is entitled to reimbursement of the expenses incurred in taking such steps.[108] The entitlement is not affected by the failure of the steps to achieve the intended result as long as they are reasonable under the circumstances.

4. *Negligence in the presence of insurance may be more costly*

While financial burden from liability arises only after a loss, financial burden in the presence of insurance may be borne both before and after the loss. An insured may have already paid its premium based on its expected liability. Yet despite insurance if the insured has to pay personally for liability due to a coverage-excluding conduct, it pays the premium and at the same time bears the liability. In other words, in such a situation it bears the financial burden twice. Even when insurance contains no coverage exclusion or reduction, the insured's expected financial burden (i.e., premium) in the presence of insurance is likely to be more than its expected liability in the absence of proper care. This will be clear at the end of the discussion in this section.

a. *Insurance premium theoretically equals the expected liability*

As mentioned before, theoretically an insured's premium should equal its expected liability, presuming that there are no policy exclusions and under-insurance. Yet, in practice, insurance premium will always be more than the expected liability, given the liability of the insured remains unchanged after it subscribes to insurance. This is because insurance premium includes not only the expected liability but also the administrative cost and profit elements of the insurers.[109] At this point, it may not be out of place to ask why potentially liable parties would buy insurance when it may eventually cost them more. The answer lies in the concept of risk aversion. Risk

106. *Fudge v. Charter Marine Insurance Co.*, (1992), 97 Nfld. & P.E.I.R. 91, 8 C.C.L.I. (2d) 252 (Nfld. S.C.); *Strive Shipping Corp v. Hellenic Mutual War Risks Association (Bermuda) Ltd. (The Grecia Express)*, [2002] EWHC 203 (Comm), [2002] 2 All ER (Comm) 213 (Q.B.). See also Strathy & Moore, *Marine Insurance in Canada*, *ibid.* at 181; Bennett, *The Law of Marine Insurance*, *supra* note 39 at 750-53.

107. *MIA*, *supra* note 37 at ss. 79-80; *UK-MIA*, *supra* note 37 at s. 78.

108. The "sue and labour" clauses in the Lloyd's S.G. policy and modern hull and cargo policies all contain express undertakings by the insurer to pay for such expenses. See *supra* note 105. The provisions of *MIA*, *supra* note 37 at s. 79(1), and *UK-MIA*, *supra* note 37 at s. 7(1) reflect this marine insurance practice.

109. See Shavell, *Economic Analysis of Accident Law*, *supra* note 9 at 198.

aversion is the tendency of a person to fear the loss of a bigger amount with lower probability more than the loss of a smaller amount with higher probability, even though the expected loss is the same in both cases. For example, the loss of $100,000 with 1 percent probability and another loss of $10,000 with 10 percent probability or a certain loss of $1,000 have the same expected value, i.e., $1,000.[110] Yet, in the first instance, a risk-averse person may be willing to pay its insurer more than $1000 (i.e., the expected liability) in insurance premiums in order to transfer the risk to the insurer,[111] even though the payment of the premium is certain and the odds of being not liable are ninety nine percent.

b. *Insurance premium may be more or less than the pre-insurance expected liability*

The liability of the insureds, however, may increase or decrease after they purchase insurance. It may increase if the problem of moral hazard is serious. It may also decrease if the insurers can induce the insureds to take better care than what the insureds would have taken in the absence of insurance. As we have been maintaining in this paper that insurers can induce a potentially liable person to take better care than what the liability law alone would do, this raises the possibility that the insurance premium can be less than the pre-insurance expected liability. This will occur if the difference between the pre-insurance expected liability and the post-insurance expected liability due to better care is more than the insurer's administrative cost and profit combined. We have seen that the possibility of better incentives and further reduction of loss can become a reality because of the insurers' better information on optimal care and also because of their ability to offer better financial incentives through insurance mechanisms. An example may be in order here.

If statistics compiled by the insurers from the loss history of the insureds prove that most of the collisions occur due to the absence of proper lookout, the insurers may deduce from the statistics that keeping a crew member on the bridge of ships on a regular basis will substantially cut down the number of collisions.[112] Even though employing an additional crew member for the proper lookout would be efficient from the perspective

110. See Pauly, "The Economics of Moral Hazard," *supra* note 3 at 532; Shavell, *Economic Analysis of Accident Law*, *supra* note 9 at 186-87; Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 258.

111. The amount an insured pays the insurer above the expected loss/liability is known as "risk premium": Steven S. Stephens, "The Consequences of Expansionary Workers' Compensation Policy" (1995) 46 Lab. L.J. 17 at 26.

112. This example is a modified version of the finding of the Norwegian P&I Club Gard AS; see *Gard's Claims Statistics*, *supra* note 76 at 18-19.

of long term loss/liability, an insured may not see its net benefit due to its lack of information about the probability and magnitude of loss caused by this factor alone. On the other hand, the insurers' research may show that the employment of an additional crew member would reduce the current probability of average collision liability of $100,000, for instance, from 10 percent to 5 percent (i.e., from expected liability of $10,000 to $5,000). If the wage of the additional member is, say $3,000, i.e., less than the difference of liability before and after employing the crew member,[113] the employment would bring a net saving of $2,000. In other words, in the absence of insurance, due to lack of information, the insured took less care and its expected liability was $10,000. In the presence of insurance, the expected liability is now $5,000. If the insurer's administrative cost and profit amount to $1,000, the insurance premium would be now $6,000, much less than the pre-insurance expected liability of $10,000. The insured's net saving would be $1,000 (i.e., $10,000 pre-insurance expected liability minus $6,000 for insurance premium and $3,000 for wage of the additional crew member). This example shows that despite the additional administrative costs of liability insurance, the existence of liability insurance may not only lead to better care and precaution but may also bring net savings for the insured.

The above example can also be used to show that negligence in the presence of insurance is more costly than in its absence. The insured's expected liability before insurance was $10,000, but its insurance premium would be $11,000 ($10,000 in expected liability plus $1,000 for insurer's cost and profit) if it did not employ the additional crew member.[114] Not employing the additional crew here would amount to negligence and the insurance premium would be more expensive than the pre-insurance expected liability. As the hiring of an extra crew member at a cost of $3,000 would reduce the premium from $11,000 to $6,000, the insured being a rational individual would employ the extra crew member. Whether the insured in fact employed the required number of crew or not, the insurer may easily verify.

Among the insurance mechanisms, rate variance would be the most effective tool here to motivate the insured to adequately staff the ship. For additional guarantee, the insurer may make it an express warranty in the insurance contract that a certain number of crew members must always

113. The difference is $5,000. Before appointment of the additional crew member the expected liability was $10,000 (10% multiplied by $100,000) and it would be $5,000 (5% x $100,000) after the appointment.

114. See generally Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 264-65.

be present in the ship or on the bridge.[115] With regard to the remaining 5 percent of collision probability in above example, certain precautions may reduce the probability further.[116] If the insurer cannot observe those aspects of precaution, it may incorporate in the policy deductibles and/or policy limits to maintain incentives in the minds of the insureds. As we have seen earlier, deductible and policy limit may induce an insured to spend more on care than merely the expected value of the deductible and liability ceiling. Because, by definition, an insured is a risk-averse party, it would rather spend more on care than bear the burden of deductible or liability exceeding the policy limit even though the expected value of the burden is less than the cost of care.[117]

5. *Additional reasons why insurance may lead to better care*

a. *Insurance facilitates research and innovation on loss reduction*

The above example also shows that insurers can classify the causes of loss and then guide the insureds to adopt the appropriate precautionary steps to control future losses. There may be as-yet undiscovered but better cost-efficient techniques to reduce losses. Discovery of those techniques requires investment in research and development. An insurer is in a better position than the individual insureds to undertake this task not only because of the insurer's ability to spread the cost of research over all the insureds but also its superior knowledge on the causes of loss.[118] There is no comparison here between insurers and courts. Courts' suggestions in their decisions on various aspects of care would be limited to only the known techniques. In fact, courts' knowledge on some known techniques may be even inferior to that of the liable parties when they are of a technical and complicated nature. Although courts may seek expert testimony, the knowledge of an expert is also confined to the existing techniques.[119]

A possible disincentive to an insurer's investment in research and innovation is the fact that the competitors of the insurer may benefit

115. See, for example, *De Hahn v. Hartley* (1786), 99 E.R. 1130 (K.B.), where the insurer required the presence of fifty crew members, but the ship had only forty-six at the beginning of the voyage. Although the ship had fifty-two crew members at the time of the insured peril, the insurance was held voidable.

116. The probability of collision incidents may never be zero either because no optimal care is possible or because there is always some unavoidable accidents due to the elements of the sea. See generally Calabresi, *The Costs of Accidents*, *supra* note 7 at 17-18.

117. Spending more than the expected deductible or the amount above the policy limit will not be undesirable as long as such spending is less than the total expected loss or liability.

118. See Abraham, *Distributing Risk*, *supra* note 3 at 15-16. See also J. Kehne, "Encouraging Safety Through Insurance-Based Incentives: Financial Responsibility for Hazardous Wastes" (1986) 96 Yale L. J. 403 at 407 [Kehne, "Encouraging Safety"].

119. See *supra* note 34.

from its research and innovation without incurring the corresponding cost.[120] This may be overcome by coordination and joint undertaking of research initiatives by the insurers. An ideal example in this regard is the International Group of P&I clubs. The Group consists of thirteen large P&I clubs and covers over 90 percent of the world's ocean-going tonnage.[121] The members of the clubs belonging to the Group benefit from the shared experience and exchange of information among clubs on various common issues of concern.

b. *Insurance also helps insureds to know better about optimal care*

This is an obvious point. There is no use of insurers obtaining information on optimal care and on better techniques to prevent or minimize loss if the insureds are not aware of those techniques. An insurer needs to convey the acquired information to the insureds so that they can take optimal care and employ the techniques in the insured activities. As we have seen throughout the paper, better information combined with stronger financial incentives through various insurance mechanisms leads to improved care and safety in the presence of liability insurance. This only occurs in practice if the insured knows what the optimal care is and what financial benefits it would receive from the insurer by exercising optimal care.[122]

c. *Insurer's failure to create incentives may affect the very survival of its business*

While failure of a court to accurately determine optimal care in a liability situation has no effect on the continued existence of the court, such failure by an insurer, if regular, may threaten the very survival of the insurer's business in a competitive market.[123] As we have seen, calculation of the correct premium rate depends on proper determination of expected loss/ liability of an insured. Insurers constantly need to assess each insured's expected liability and then set and adjust the premium accordingly to reflect the expected liability. If potential increase in the premium rate following a loss caused by negligence is more than the cost of care, the insured would take care and prevent the loss from occurring. On the other hand, if the insurer does not adjust the premium and roughly charge the same premium to all insureds, the insurer will attract high-risk insureds and will

120. See Abraham, *Distributing Risk*, *supra* note 3 at 78-79; Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 36-37.

121. Mark Tilley, "The Origin and Development of the Mutual Shipowners' Protection & Indemnity Associations"(1986) 17 J. Mar. L & Com. 261.

122. See Abraham, *Distributing Risk*, *supra* note 3 at 73-74.

123. Kehne, "Encouraging Safety," *supra* note 118 at 412. See also Calabresi, *The Costs of Accidents*, *supra* note 7 at 61-62.

cause low-risk insureds to leave the insurance pool. Left with only high-risk insureds, insurers would either have to charge very high premiums or incur substantial loss. Both options will lead to loss of business and possible bankruptcy of the insurer.

The reason for this in the second option is obvious. The reason in the first option is that each relatively low-risk insured has to pay more than its expected loss to cover for relatively high-risk members in the pool; the low-risk insureds would be better off either to self-insure or to seek coverage elsewhere, which they will do in a competitive market. This phenomenon is known as "adverse selection" in insurance literature[124] and was the cause of the demise of the nineteenth century hull insurance clubs.[125] To avoid this phenomenon and to induce each individual insured to take care, insurers today not only separate their insureds and the risks they bring into groups and classes[126] but also vary the premium rate for different insureds under the same group/class.

III. *Empirical evidence*

a. *Marine insurance*

Since marine liability insurance is as old as maritime liability law itself, it is hard to find statistics to show the difference in loss rate, if any, before and after the liability insurance in order to prove the positive impact of insurance on incentives. However, there are statistics in many areas of liability, where the claims for losses are on the decline due to the proper identification by the insurers of the causes of loss or injury. For example, the statistics for 1993-2003 on liability for physical injury to crew members in vessels insured by the Norwegian P&I club Gard show that the average claim decreased from about US$25,000 to $15,000.[127] Not only the average claim amount, but also the total number of claims was on the decline despite the increasing tonnage of the club's insured fleets.[128] This was partly due to Gard's finding from the claim history the main causes of

124. See Abraham, *Distributing Risk*, *supra* note 3 at 67-68.

125. With the removal of monopoly on marine insurance in 1824 in the UK, the marine insurance market became more competitive and well-built ships received offers of better premium rates from market insurers than from the mutual hull insurance clubs with fixed premium rates. As a result, hull insurance clubs were left with "rust buckets" and were eventually dissolved: Bennett, *The Law of Marine Insurance*, *supra* note 39 at 11, n. 42.

126. While in marine insurance determination of the class of a ship or its assignment to a particular risk group mainly depends on its physical strength, in automobile insurance risk classification may be based on the age and gender of an insured, among other factors.

127. See *Gard's Claims Statistics*, *supra* note 76 at 24. However, crew claims in Gard represent the largest claim category in terms of liability payment. Most crew claims involve illness and disease.

128. *Ibid.*

crew injuries, which are mostly preventable.[129] Similarly, the incidents of and total liability for collisions are also in decline.[130]

On the other hand, statistics of the same P&I club on 119 major cargo claims between 1996 to 2000 show an upward trend in the value of the average claim. These statistics, however, have to be considered in light of the facts that 1) these claims concern liability exceeding US$150,000 each; 2) increasing value of the cargoes has been a factor; 3) no allowance has been made for inflation; and 4) there was no mention about the total claims per year.[131] Even when liability claims are increasing, it does not necessarily prove that there was no incentive effect of liability insurance on precautionary steps. An increase in liability claims may be due to economic as well as legal inflation, i.e., application of new legal doctrines increasing the amount of liability paid by defendants or their insurers.[132] Another possible reason for increase of claims is the reduced incentives due to limitation of liability principle in maritime law.[133] In other words, if all these factors are accounted for, there is a strong possibility that liability arising from negligence is on the decline because of the existence of liability insurance.

b. *Non-marine insurance*

There are also proofs in other areas of liability where the insurers' research and increased incentives by insurance mechanisms led to reduction in the incidents of loss and the consequent liability. In 1930s and 1940s insurers' inspection and research improved elevators' and boilers' safety and reduced accident rates.[134] There is also evidence that industrial accident rate, particularly death rate, declined sharply due in part to incentives created by insurers,[135] although the claims for non-fatal injuries increased.[136] As for automobile insurance, the incentive effect of liability insurance on accidents may be indirectly proved by the increase of fatalities in no-fault liability system, i.e., where third party liability is

129. See *ibid.* at 25.

130. Ten-year statistics (1992 to 2002) on collision liability in Gard show that collision liability accounts for 3.1 percent in terms of number of all P&I claims but 12 percent in terms of value. However, the average cost of collision liability is on the rise. *Ibid.* at 18.

131. *Ibid.* at 3-4.

132. See Abraham, *Distributing Risk*, *supra* 3 note at 46.

133. See Billah, "Economic Analysis of Limitation of Shipowners' Liability," *supra* note 77.

134. James, "Accident Liability Reconsidered," *supra* note 1 at 561.

135. *Ibid.*

136. See Stephens, "The Consequences of Expansionary Workers' Compensation Policy," *supra* note 111 at 24.

either completely or partially eliminated.[137] This may, however, simply be due to the absence of liability rather than liability insurance. Yet high liability insurance premium for more accident-prone drivers especially for young male drivers contributes to the reduction of number of accidents at least by delaying their driving activity.[138]

Conclusion

Liability laws may fail to produce optimal care for various reasons including the courts' lack of information on optimal care. While liability insurance may cause moral hazard and reduce the incentives effect of liability law, insurers' superior information on optimal care combined with their ability to produce stronger financial incentives through rate variance and coverage restrictions will bring the insureds' care level closer to optimal care. The fact that liability insurance can produce better solicitude than liability law alone may have significance in the very future of liability law in certain areas. With widespread first party insurance the role of liability law as a source of compensation is decreasing in significance. The justification of liability law mainly hinges on its effect in creating incentives in the minds of potentially liable parties to exercise care. Even if this benefit of liability law may not sometimes clearly outweigh the administrative costs associated with maintaining the liability system,[139] creation of additional incentives through liability insurance may tip the balance in favour of liability law. Without the liability law, there would be no liability insurance; and without liability insurance, the possible additional incentives from it would be lost. This seems to be the case in the no-fault liability system.[140]

137. See Alma Cohen & Rajeev Dehejia, "The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities" (2004) 47 J. L. & Econ. 357; Elisabeth M. Landes, "Insurance Liability and Accidents: A Theoretical and Empirical Investigation of the Effect of No-Fault Accidents" (1982) 25 J. L. & Econ. 49.

138. See Posner, *Economic Analysis of Law*, *supra* note 15 at 201-202.

139. High administrative cost is the main argument against the automobile accident liability law system and in favour of no-fault liability system. Landes, "Insurance Liability and Accidents" *supra* note 137 at 49; Posner, *Economic Analysis of Law*, *ibid.* at 201-202; Shavell, *Foundations of Economic Analysis*, *supra* note 6 at 281-82.

140. The absence of liability in such no-fault accident regimes has been partially blamed for the increase of automobile accidents. See Cohen & Dehejia, "The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities," *supra* note 137; Landes, "Insurance Liability and Accidents: A Theoretical and Empirical Investigation of the Effect of No-Fault Accidents," *ibid.*; also see Posner, *Economic Analysis of Law*, *ibid.* at 203-204.