Non-pecuniary losses in the economic analysis of torts: a plea for ex ante determined damages

Louis Visscher and Vaia Karapanou[*]

1. Introduction

There is a striking difference between the legal answer in most countries to the question whether non-pecuniary losses should be included in tort damages and the economic approach to this topic. As can be seen in the papers presented at this workshop, even though in many jurisdictions there is discussion about which non-pecuniary losses should be included in tort damages and about how damages for non-pecuniary losses should be assessed, in most jurisdictions it is not debated that indeed non-pecuniary losses in principle should be included. The economic literature on the other hand does not answer this question unambiguously. From an economic point of view, damages in tort law aim to fulfill the goals of deterrence and loss spreading.[1] Whether these goals can be reached, depends heavily on the calculation of damages. If the award of damage compensation correctly reflects all the losses inflicted, the tortfeasor may be induced to perform his activities less often and/or more carefully.[2] Also for the goal of loss spreading it is important that damages reflect the actual losses. After all, if a part of the losses is excluded, it will not be subject to the spreading potential of tort law and (liability) insurance.

In the Law and Economics literature, two approaches toward compensation of non-pecuniary losses are distinguished. According to the *prevention theory*, such losses have to be compensated, because in order to give optimal incentives to the injurer, damages should encompass all losses he may cause, both pecuniary and non-pecuniary. The difficulty with non-pecuniary losses is that they cannot be measured directly, so that we need an indirect method to assess them. According to the *insurance theory* the level of insurance coverage against non-pecuniary losses is such an indirect method. It argues that compensation for non-pecuniary losses depends on whether a rational victim would self-insure against them. We treat the debate between both theories in more detail in Section 2.

In Section 3 we argue that the insurance theory is not a proper indirect way of assessing non-pecuniary losses, because insurance decisions regard risk aversion rather than the question how potential victims view non-pecuniary losses. In our view, so-called *ex ante determined damages* are a better approach. This idea of ex ante determined damages in the economic

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[1] See, among many others, Calabresi, 1977, 26ff; Shavell, 2004, 175; Schäfer & Ott, 2005, 125ff; Cooter & Ulen, 2012, 190ff.
[2] See e.g. Posner, 1972; Brown, 1973; Shavell, 1980; Shavell, 2004, 242.

literature is discussed in the setting of fatalities, but is not elaborated upon in case of non-fatal injuries, which in practice is the most important area of non-pecuniary losses. Given this importance, in this paper we focus our attention on pain and suffering damages for nonfatal injuries. In Section 4 we will explain that in our view, the concept of *Quality Adjusted Life Years* (QALYs) from the domain of Health Economics is well suited to act as a measure of ex ante determined damages. QALYs regard the impact of diverging health impairments on the quality of life and express the value of living one year in a certain health condition and encompass the severity and duration of a health impairment.[3] These are the essential elements which have to be reflected in damages.

In Section 5 we argue that QALYs can be utilized as a more systematic measure to assess pain and suffering damages for personal injuries than the current legal practice.[4] The way in which non-pecuniary losses are treated and the magnitude of the amounts awarded for their compensation varies considerably between and even within countries.[5] In several European countries, as can be seen in the various papers of this workshop, courts rely on previous decisions for similar injuries. In others, courts use injury damage tables, tariffs and guidelines and in some jurisdictions courts decide with full discretion. In the USA, juries are provided with general, abstract instructions and no meaningful guidance, whereas appellate judges reviewing pain and suffering awards may take amounts awarded for similar injuries into consideration, but they lack an objective standard to evaluate the reasonableness of the award.[6] In some American jurisdictions, jurors are allowed to use the 'per diem' method according to which they multiply a unit of time with a dollar amount that corresponds to the plaintiff's injury and then multiply the result with the plaintiff's life expectancy.[7] Diverging practices lead to unpredictable and varying damages, which in our view frequently do not reflect the true magnitude of the loss inflicted. A correct assessment of damages would involve not only incorporating all incurred losses in the compensation award but also calculating the damages in a consistent way, taking into consideration objective criteria for the assessment, such as duration and severity in cases of personal injury. Existing legal frameworks cannot adequately evaluate such aspects.

In Section 6 we provide several examples which show how QALYs can be used for the assessment of pain and suffering damages. Exactly because QALYs incorporate the severity and duration of health impairments, they can serve as an external framework for pain and suffering damages assessment. This way, such damages can be founded on their very basis, being the impact of the personal injury on the quality of life of the victim.

In Section 7 we conclude.

2. Non-pecuniary damages in the Law and Economics literature

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[3] See the literature referred to in footnote 43.
[4] Also see Karapanou and Visscher, 2010; Karapanou, 2014.
[5] Bovbjerg, Sloan & Blumstein, 1989, 916-917; Magnus, 2001; Rogers, 2001; Markesinis et al., 2005, 16ff.
[6] Viscusi, 1988, 204, 217; Bovbjerg, Sloan & Blumstein, 1989, 910ff; Avraham, 2006, 90-92.
[7] Poser, Bornstein & McGorty, 2003, 63-64; Avraham, 2006, 90-92.

2.1 Losses and damages

In Law and Economics the impact of law on social welfare, which is often seen as the sum of the utility levels of the members of society, is analyzed.[8] In the economic analysis of tort law, losses are seen as a decrease in the level of utility of the victim. Such losses hence lower social welfare. Tort liability can provide incentives to the relevant actors to take measures (e.g. taking more care or reducing the activity level) which may avoid such losses or reduce the probability of their occurrence. Such measures entail costs themselves, so that a weighing has to be made between the costs of such precautionary measures on the one hand and the losses they may avoid on the other. In principle, tort damages should result in full compensation, because only then the full decrease in utility will be weighed against the cost of precautionary measures, thereby providing desirable behavioral incentives to potential tortfeasors.[9] Losses which are too expensive to avoid, should subsequently be optimally spread, because concentrated losses cost more utility than spread losses.[10]

The distinction between pecuniary and non-pecuniary losses is made as follows. In case of a pecuniary loss, the victim loses money or replaceable goods. The damages received by the victim make up for the loss in money or enable him to replace the lost goods.[11] In case of a non-pecuniary loss, non-replaceable 'goods' such as e.g. family portraits, but also health and emotional well-being are lost or damaged.[12] The damages received by the victim do not enable him to replace the lost goods. The money yields utility, but it does not mend the immaterial losses.

Cooter and Ulen spend attention to the problem of how courts should assign a money value to non-pecuniary losses. The idea of perfect compensation, meaning that the amount of compensation brings the victim back to the same utility level he had before the accident, is 'the right goal for courts trying to internalize costs, but implementing the goal is difficult for intangible, but real, harms'.[13] This is so because it is not possible to observe and measure this subjective loss, and also because the idea of perfect compensation fails in situations where the money received does not make up for the immaterial loss. Cooter and Ulen describe that these problems have resulted in the same court awarding different amounts for victims with identical injuries, and of course also different courts awarding different amounts for identical injuries. This is an issue to which we return in Section 6.

2.2 Prevention theory and insurance theory

Within Law and Economics, two approaches exist regarding the question whether immaterial losses should be compensated. The first, the 'prevention theory', is already described above: In order to provide the potential injurer with the correct behavioral incentives, he has to

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[8] See e.g. Arlen 2000, p. 683; Posner 2003, p. 24ff; Shavell 2004, p. 2; Schäfer and Ott 2004, p. 47.
[9] For the exceptions, see e.g. Arlen 2000, p. 682; Visscher 2009, p. 156ff.
[10] This is due to the decreasing marginal utility of wealth, which is further explained in Section 2.2.
[11] Arlen 2000, p. 683.
[12] Shavell 1987, p. 133; Arlen 2000, p. 697ff; Shavell 2004, p. 242.
[13] Cooter and Ulen 2012, p. 192.

compensate both pecuniary and non-pecuniary losses, because both types constitute losses to the victim. If the injurer does not face both types of losses in the expected damages, he does not fully internalize the negative externalities of his behavior, and tort law then cannot reach its preventive goal.[14] The prevention theory hence focuses on Calabresi's primary accident costs (i.e. the sum of the costs of preventive measures and the losses that are still expected to occur)[15] and weighs the additional costs of care measures against the resulting decrease in expected accident losses (both pecuniary and non-pecuniary). So, according to the prevention theory non-pecuniary losses should be included in tort damages. However, it does not answer the question *how* such losses can be assessed.

Ott and Schäfer discuss this problem that non-pecuniary losses are difficult to assess. Given that these losses do not have a market value, the authors argue that one should determine in an indirect way how many resources should be spent on precautionary measures. A possible way to do this is to investigate how much money people are willing to spend on insurance against non-pecuniary losses.[16] This approach is referred to as the 'insurance theory'. Compensation should only be provided for losses against which rational individuals would purchase insurance, so it is argued. If they would not buy insurance against immaterial losses, tort law should not force such coverage upon them.[17] This especially holds in situations where these people would ultimately pay for this coverage via an increase in the price of the products, services or activities involved. Tort damages are regarded as a way to cover losses and hence they serve a similar goal as insurance, for which the person who receives the coverage pays a price.[18]

In case of *pecuniary* losses, people want to buy insurance because money has a decreasing marginal utility: with the first money someone acquires, he will fulfil his most important needs, so that this money yields much utility. The more money someone already has, the less additional utility additional money will yield, because it will be spent on less important needs. In case of a pecuniary loss, after the accident someone has less wealth left than before the accident. Money after the accident therefore has a higher marginal utility because the person involved has less of it than before the accident. Insurance allows people to distribute resources across the different states of the world, in such a way that they improve their situation.[19] In essence, one shifts money with a relatively low marginal utility in the pre-accident situation (the premium paid) to the post-accident situation (the insurance coverage) where the money has a higher marginal utility. Therefore people are willing to pay an insurance premium in order to receive money after the accident.

With *non-pecuniary* losses, according to the insurance theory this line of reasoning does not hold. Cook and Graham explain this by using the concept of a *ransom*, i.e. the maximum

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[14] Adams, 1989, 213, 214; Ott & Schäfer, 1990, 566; Arlen, 2000, 702; Shavell, 2004, 242; Cooter & Ulen, 2012, 191ff.
[15] Calabresi 1977.
[16] Ott & Schäfer, 1990, 566.
[17] Shavell, 1987, 228ff; Adams, 1989, 216, 217; Schäfer & Ott, 1990, 568; Pryor, 1993, 101ff; Shavell, 2004, 269ff.
[18] Rubin and Calfee 1992, p. 250; Arlen 1993, p. 117; Geistfeld 1995, p. 793ff; King 2004, p. 184.
[19] Croley & Hanson, 1995, 1822.

amount an individual would be willing to pay to avoid losing an irreplaceable commodity. In situations of replaceable commodities and actuarial fair premiums, the individual will fully insure. However, if the commodity is irreplaceable but 'normal' (in the sense that the individual is willing to pay a higher ransom if he has a higher level of wealth), he will not buy full insurance. Cook and Graham show that in such a case the marginal utility of wealth is lower in the state where the individual loses the irreplaceable commodity than the marginal utility of wealth after paying the ransom in the state where he does not lose it. This result indicates that an individual would only buy full insurance coverage for a replaceable commodity and leads the authors to the conclusion that 'the goal of full compensation to victims of violent crime or accidents that result in injury or death is not compatible with economic efficiency' and that 'full compensation is an inefficient policy for tort settlements that involve irreplaceable commodities'. [20]

Danzon argues that full compensation is only optimal for purely monetary losses. However, for injuries which affect the utility of wealth, optimal compensation is higher if the accident increases the marginal utility of wealth, and lower if it decreases it.[21] Whether disability increases or decreases marginal utility of wealth cannot be determined theoretically. Danzon investigates whether people take out full insurance coverage against non-pecuniary losses and whether such losses are included in compulsory public coverage. The results she finds indicate that full coverage for all losses 'far exceeds the coverage people are prepared to pay for given the choice'.[22]

Friedman states that marginal utility of wealth will actually *decrease* due to bodily injuries, because such injuries eliminate ways in which the individual can spend his wealth. If the individual now reallocates his wealth to different activities than before the accident, these activities necessarily have a lower marginal utility, because otherwise he would have spent more on it already before the accident. Hence, full compensation is inefficient.[23] Empirical research allegedly corroborates the idea that injuries reduce the marginal utility of wealth.[24]

Summarizing the line of reasoning of the insurance theory: because non-pecuniary losses do not involve a loss of wealth, marginal utility of wealth does not increase, and likely decreases, after the accident. A rational individual hence is not willing to buy insurance, because paying the premium costs more utility than the expected insurance coverage yields after the accident. Since the victim is not willing to self-insure against non-pecuniary losses, tort law should not force such coverage upon him.

2.3. Criticism regarding the insurance theory

It follows that according to the prevention theory the injurer should be liable for the immaterial losses he has caused, but according to the insurance theory the victim should not receive

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[20] Cook & Graham, 1977, 151, 155.
[21] Danzon, 1984, 520, 521.
[22] Danzon, 1984, 524. Also see Croley & Hanson, 1995, 1801.
[23] Friedman, 1982, 82.
[24] Viscusi & Evans, 1990; Evans & Viscusi, 1991, 102ff.

compensation for these losses. However, several authors have expressed criticism regarding the viewpoint of the insurance theory that marginal utility of wealth would decrease or stay the same after suffering a non-pecuniary loss. These authors challenge the conclusion that rational people would not want to self-insure against non-pecuniary losses.

Croley and Hanson argue that people *do* want to insure against non-pecuniary losses because such losses lower their 'baseline utility'.[25] The authors distinguish between 'baseline-independent' utility and 'baseline-dependent' utility. According to this distinction, the overall well-being of an individual (his baseline utility) affects the marginal utility of wealth under certain conditions, while it does not under other conditions. They provide a clear example of baseline-dependent utility: in deciding which of two friends to give an opera ticket, the friend who enjoys opera more in principle will derive more utility from the ticket. However, if the other friend has a difficult period in his life, an evening out (whether it is the opera or something else) might give him much utility, given that his baseline is so low. Therefore, it could be that the second friend derives more utility from the ticket, even though the first friend likes opera better.

The authors furthermore argue that individuals may use insurance not only to substitute money with a low marginal utility for money with a high marginal utility, but also to increase the baseline utility in the post-accident state. Therefore, people may want to take out insurance against non-pecuniary losses after all.[26]

However, imperfect information regarding the extent of the non-pecuniary losses, the probability of their occurrence and the compensation needed, countervailing social norms in the form of societal rejection of pricing pain and sorrow and legal restrictions such as the indemnity principle prevent manifestation of demand for such insurance.[27] The authors argue that in practice there *is* such insurance available, albeit under different names. They provide the example of first party accident insurance that compensates the insured when he is legally entitled to recover damages from an uninsured, judgment proof motorist. This insurance also covers non-pecuniary losses.[28]

On the supply side of the insurance market, adverse selection and moral hazard occur due to limited monitoring possibilities regarding non-pecuniary losses. This may prevent insurers to satisfy consumers demand.[29]

Pryor argues that the conclusion from the insurance theory that the marginal utility of wealth remains the same or even decreases after suffering non-pecuniary losses is flawed. First, empirical research in this area is based on the viewpoint of nondisabled. Given their informational problems and their inability to assess how a disability may transform ones preferences, values, desires, et cetera, Pryor doubts whether they can provide accurate statements about marginal utility of money after a disability. She assesses that these problems will lead to an underestimation of marginal utility.[30] Furthermore, she argues that although the insurance theory makes the compensation of losses conditional on whether they are pecuniary

[25] Croley & Hanson, 1995, 1815.
[26] Croley & Hanson, 1995, 1827, 1834.
[27] Croley & Hanson, 1995, 1827, 1845ff.
[28] Croley & Hanson, 1995, 1827, 1862ff.
[29] Bovbjerg, Sloan & Blumstein, 1989, 934.
[30] Pryor, 1993, 110ff.

or non-pecuniary, it does not provide clear guidelines regarding this distinction and thus does not clarify which part of the losses should be compensated and which part not.[31]

In the literature, decoupling liability is sometimes suggested as a solution to the tension between prevention theory and insurance theory.[32] Under decoupled liability the injurer pays an amount reflecting all the losses he has caused, while the victim only receives an amount equivalent to what he would have spent for insurance coverage. The payment of the injurer hence exceeds compensation to the victim and the idea is that the extra amount is collected by the state in the form of a fine. In our view this would even worsen the position of the victims: they pay an increased price (because the injurer is liable for the non-pecuniary losses) but they do not receive coverage! If damages paid by the injurers could ex ante be distributed over all victims this problem would not occur. However, such a system may not be feasible in practice. Another proposal to address the tension is to develop a market in unmatured tort claims.[33] Potential victims could sell their future tort claims to third parties and injurers (and/or their insurers) could buy them. If an accident would then materialize, no litigation would be necessary. Injurers will have an incentive to take precautionary measures to reduce the cost of the claim and potential victims will be required to buy insurance to cover the loss from the sold future tort claim. However, this solution is problematic not only because the conclusion of contracts is not possible for tort cases where parties are perfect strangers but also because bargaining and informational problems may impede the transaction of tort claims, hence inhibiting the creation of a market in unmatured tort claims in the first place.

It follows that the most important Law and Economics proposals so far to provide a measure of non-pecuniary damages involve either the interference of the state or arranging non-pecuniary damages through contract. In our view, a better indirect way of assessing non-pecuniary damages is possible within tort law as explained in the sections below.

3. Ex ante determined damages

The authors discussed in Section 2.3 all question whether the conclusion from the insurance theory that rational individuals do not want to self-insure against non-pecuniary losses is correct. However, even if the insurance theory would be correct so that a rational person would not self-insure against non-pecuniary losses, this in our view should not lead to the conclusion that tort damages should not encompass such losses. Insurance decisions relate to the risk attitude of the actors involved, but not to how they experience the potential loss.

A better indirect way of assessing non-pecuniary damages is to study how many resources the potential victim is willing to spend in order to avoid non-pecuniary losses, or at least to reduce the probability of suffering such losses.[34] These resources are, in the view of the potential victim, equivalent to avoiding (or reducing the probability of suffering) the non-pecuniary

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[31] Pryor, 1993, 125ff.
[32] See Spence, 1977; Polinsky & Che, 1991; Arlen, 2000, 706ff.
[33] Cooter, 1989.
[34] Also see Friedman, 1982, 83 and 85; Danzon, 1984, 526; Bovbjerg, Sloan & Blumstein, 1989, 913; Ott & Schäfer, 1990, 568; Geistfeld, 1995, 779; Arlen, 2000, 703ff; Schäfer & Ott, 2005, 371; Cooter & De Pianto, 2013, 447.

losses and they form the basis of so-called *ex ante determined damages*. Such damages provide the correct deterrent incentives to the potential tortfeasor, who correctly internalizes the costs the victim would be willing to spend on accident avoidance. In addition, the victim is not 'over-insured' against his will, because the amounts are based on the expenditures he himself would be willing to make.

This line of reasoning can be further explained with the use of Figure 1 below. Wealth is shown on the horizontal axis, the utility it yields on the vertical axis. The decreasing marginal utility of wealth is shown by the shape of the utility curve: the more wealth someone already has, the less utility a given increase in wealth adds so that the curve becomes flatter. If a person who starts in position A on utility curve U_1 suffers a *pecuniary* loss of €5,000 which brings him to point B on the same curve, marginal utility of wealth has increased because the curve is steeper in point B. This implies that an additional euro in point B adds more utility than an additional euro in point A. However, if our person instead of a pecuniary loss suffers a *non-pecuniary* loss which does not affect his wealth, he shifts from point A to point C on the lower utility curve U_2. This downward shift reflects that for all wealth levels, utility is now lower than before. The vertical difference between U_1 and U_2 therefore represents the decrease in utility caused by the non-pecuniary loss. The slope of the curves in A and C is identical, reflecting the argument of the insurance theory that our victim does not want to insure against such losses.[35]

Figure 1 – insurance, ex ante determined damages and ex post determined damages

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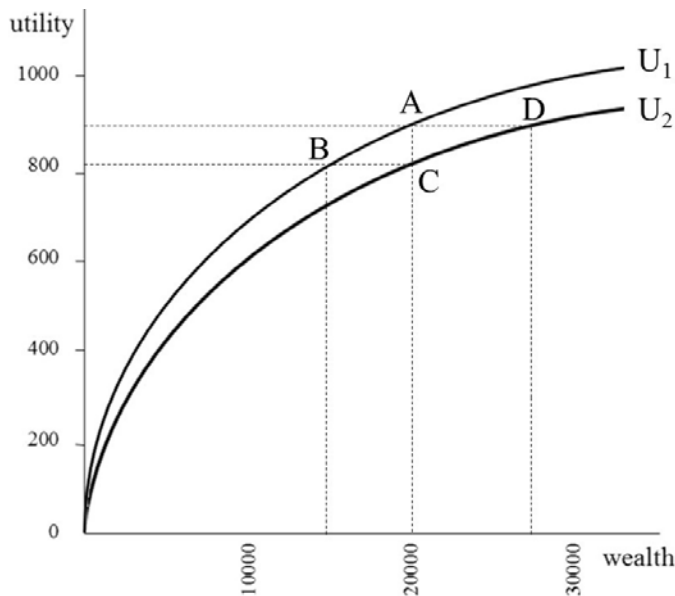
[35] Note that in Figure 1 the utility curve keeps the same form and is merely shifted downward. This reflects the argument of the insurance theory that marginal utility of wealth stays the same after a non-pecuniary loss, which in this section is assumed to be correct for the sake of argument. If marginal utility of wealth would decrease, the curve would become flatter, and if it would increase the curve would become steeper. This in itself does not change the line of reasoning of the current section, which focuses on the ex ante willingness to pay to avoid the loss, and not on the marginal utility of wealth.

Figure 1 also shows that the utility level of our victim is identical in point B and C. This implies that he is indifferent between losing €5,000 (bringing him to B) on the one hand and suffering the non-pecuniary loss (bringing him to C) on the other. Therefore, this person is willing to spend up to €5,000 in exchange for not suffering the non-pecuniary loss. This €5,000 is his *ex ante willingness to pay* ('WTP') to avoid the loss. In other words, expressed in monetary terms the victim himself assesses the non-pecuniary loss at €5,000. This implies that the injurer should also take this amount into consideration in weighing the costs and benefits of taking any precautionary measures. If we now base tort damages on this €5,000 we indeed incentivize the potential tortfeasor to take care measures which cost less than €5,000, which is desirable behavior.

Note that the traditional legal idea of *ex post determined damages* aims at bringing a victim back to the utility level he had before the accident. In terms of Figure 1, the victim should then receive damages bringing him from point C (after having suffered the losses) to point D (with the same utility level as in the *status quo ante*). Given decreasing marginal utility of wealth, these ex post determined damages by definition exceed the ex ante determined damages. In Figure 1 they would amount to about €7,000. Such damages hence incentivize potential tortfeasors to take care measures which cost up to €7,000, which is more than the €5,000 at which the victim himself assessed the non-pecuniary loss. Ex post determined damages hence result in over-deterrence, so that ex ante determined damages in our view are better.

If the non-pecuniary loss in Figure 1 would have been more severe, the situation could occur that the original utility level could not be attained anymore, because the highest point on curve U_2 would lie below the utility level of point A. In such cases, the victim cannot be fully compensated in the ex post view. However, it is then still possible to determine an ex ante WTP to avoid the loss and to use that as basis for non-pecuniary damages.

In figure 1 we have assumed an ex ante care measure which can actually avoid the loss. In practice, most care measures will only reduce the probability of such losses occurring, but they will not fully eliminate the risk. In principle, every person who is exposed to the risk should receive from the injurer the amount this person was willing to pay to avoid the risk, whether or not the risk has materialized. That way, victims would be indifferent between not running the risk on the one hand and running the risk but receiving the amount they were willing to spend on accident avoidance on the other hand. Victims are then ex ante compensated for the risk they run, and injurers receive adequate behavioral incentives because they pay for the expected harm caused by their activities. For example, assume that potential victims are willing to spend up to €100 to reduce the probability of suffering a certain non-pecuniary loss by one per mille. If an injurer who exposes these potential victims to this risk would have to pay €100 to each of them, irrespective of whether the risk materializes, the potential victims are adequately compensated for this risk and the injurer internalizes the risk he has created. However, given that under tort law the injurer can only be held liable if he indeed has caused losses, only those persons for whom the risk actually has materialized can receive damages. By multiplying the amount the victim was willing to pay to avoid the risk by the reciprocal of the accident probability, the same result can be reached: the injurer pays the amount which the victim was willing to spend on accident avoidance. This implies that the injurer from the above example

should pay €100,000 (€100/0.001) to the one-in-a-thousand victims for whom the risk materializes.[36] Therefore, according to this line of reasoning, non-pecuniary losses should be compensated on the basis of the resources that the victim would have spent himself on reducing the expected accident losses.

However, the ex ante WTP is not easily observable and may differ per person. From an economic perspective, however, it is not necessary to assess damages correctly in all individual cases, as long as they are correct on average.[37] We are therefore looking for an average ex ante WTP to avoid losses. A well-known example is the so-called Value of a Statistical Life (VSL), which concerns how many resources people are willing to spend on reducing the probability of fatal accidents.[38] The VSL is derived from decisions which people take and which influence health and safety, such as buying a dangerous product or choosing a risky job. Such choices contain an implicit tradeoff between money and safety, indicating people's WTP to reduce the probability of fatal accidents. On the basis of these tradeoffs, the VSL is estimated. The resulting amounts differ greatly, but according to Sunstein, the VSL in 2004 was set at about $6.1 million,[39] while in 2013 it was assessed at about $9 million.[40] From the VSL, which encompasses both the pecuniary and the non-pecuniary losses, according to Miller 50-75% consists of immaterial losses.[41]

Schäfer and Ott argue that compensation for pain and suffering for non-fatal injuries should be some fraction of the value attached to the WTP to prevent death. They do, however, not suggest how to determine the appropriate fractions, and neither do the other authors.[42]

We argue that the concept of QALYs enables us to extend the idea of ex ante compensation to non-fatal injuries, because it offers a systematic way to assess immaterial losses in such cases. In our view, such a framework is currently missing in the economic approach of non-pecuniary losses. It enables determining the 'fractions' Schäfer and Ott were mentioning, this way providing a basis for assessing ex ante determined pain and suffering damages for non-fatal injuries.

4. Quality Adjusted Life Years (QALYs)

A QALY is a measure regarding the value of living one year in a certain health condition. This health condition is used as a proxy for the quality of life during that year. QALYs are used in evaluating whether different health programs, medical treatments and techniques yield enough

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[36] See e.g. Friedman, 1982, 85ff; Rubin & Calfee, 1992, 249; Geistfeld, 1995, 825; Cooter 2003, p. 1112ff; Schäfer & Ott 2004, p. 246; Cooter & Ulen, 2012, 253ff; Cooter & De Pianto, 2013, 453ff. Note that Cooter and Cooter & DePianto do not use the victim's willingness to pay as basis for the calculations, but one or more care measures which in society are regarded as reasonable care measures.
[37] Kaplow, 1994, 313ff; Kaplow & Shavell, 1996, 194.
[38] Sunstein, 2004; Sunstein & Posner, 2005; for a review article see Viscusi & Aldy, 2003.
[39] Sunstein, 2004, 205.
[40] Sunstein, 2014, 7.
[41] Miller, 1989, 893-894.
[42] Schäfer & Ott, 2005, 373.

benefits to be worth their costs.[43] When combined with a monetary value, QALYs can be seen as a societal WTP to avoid health conditions or to cure them.

Each condition is assigned a QALY-weight, varying from 0.00 (death) to 1.00 (perfect health). Conditions which are regarded as worse than death have a negative value. The total QALY-loss caused by a condition is calculated by multiplying the decrease in QALY-weight by the duration of the condition.[44] Suppose that two treatments exist which are equally expensive. Treatment A increases the quality of life with 0.1 for 5 years, treatment B by 0.2 for 3 years. Treatment B is then preferred, because it yields 0.6 QALY (0.2*3) while treatment A 'only' yields 0.5 QALY for the same amount of money.

Different methods exist for establishing QALY weights.[45] In some methods, respondents are asked to compare two situations in order to elicit their overall perception of a specific ailment. In the *standard gamble* method, people are asked to choose between living in a certain health condition on the one hand, and undergoing treatment which, with varying probabilities, leads to either perfect health or death on the other hand. The lowest probability of living in perfect health which the respondents still assess as high enough to undergo the treatment determines the QALY weight of the ailment. Indifference between living with the ailment or undergoing a treatment with a 70% probability of success and a 30% probability of death, results in a QALY weight of the ailment of 0.7.

In the *time trade-off* method, respondents trade off x years in perfect health with y years with a certain health condition. If respondents assess 40 years life expectancy with the ailment as equal to 30 years in perfect health, the QALY factor is 30/40 = 0.75.

In the *person trade-off*, respondents are e.g. asked to choose between improving the health or extending life expectancy of x people in the first (better) condition and y people in the second (worse) condition.[46] If respondents are indifferent between extending life with one year for 20 healthy people and 25 people with a certain health condition, then the QALY-weight of the second health condition is 20/25 = 0.8.

In the *visual analogue scale*, respondents are asked to rank the ailment on a vertical line with concrete endpoints ranging from 0 to 100 where 0 represents death (or the worst imaginable health condition) and 100 represents perfect health (or the best imaginable health condition).

Other methods, frequently referred to as 'generic' or 'quality of life' measures, establish a QALY-weight for the quality of life of the health condition involved, taking into consideration both affected and unaffected health aspects.

The *EuroQoL EQ-5D* questionnaire differentiates health states using five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Respondents are asked to mark their health condition on the basis of these five dimensions by indicating whether they have no problems, moderate problems or extreme problems in each dimension.[47] Each of these levels is assigned a weight previously elicited by the visual analogue scale or the time

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[43] Brazier et al., 1999, 3-4; Dolan, 2000; Folland, Goodman & Stano, 2007, 81.
[44] Hammitt, 2002, 986-987; Adler, 2006, 2.
[45] Nord, 1992, 561ff; Johannesson, Jönsson & Karlsson, 1996, 283-284; Bleichrodt & Johannesson, 1997, 155-157; Brazier at al., 1999, 23ff; Dolan, 2000, 1733ff; U.S. EPA, 2001, 16-17; Hammitt, 2002, 994-996.
[46] U.S. EPA, 2001, 17; Hammitt, 2002, 995.
[47] Oemar & Oppe, 2013, 3-8.

trade off method. Subsequently respondents rank their health condition on a visual analogue scale thus communicating their overall perception of the ailment. In a newer version of the questionnaire two levels are added (slight problems and severe problems), enabling a more fine-tuned assessment.

The *Health Utilities Index Mark 3 (HUI3)* uses eight dimensions to classify health states: vision, hearing, speech, ambulation, dexterity, emotion, cognition and pain.[48] Each dimension comprises five or six different levels indicative of a gradual deterioration in that dimension. These levels are assigned a weight previously elicited by standard gamble and visual analogue scale methods.

Other generic measures to elicit QALY weights are the 'Quality of Well Being Scale', the 'SF-6D', the '15D' and the 'Rosser disability/distress scale'. However, so far the EQ-5D and the HUI3 are regarded as better measures for the QALY weight elicitation.[49]

The different methods may lead to different results, among others due to the type of questions being asked and the comparison being made (with death, perfect health or with another ailment). Furthermore it is relevant whether the questions are asked to people who actually have the ailment or not, to doctors or other health specialists. Applying QALYs to assess pain and suffering damages therefore does not result in one unique amount, but the research does provide the boundaries between which damages could vary (see Section 6 below for examples). If people with the ailment are regarded as more competent for the elicitation of QALY weights, the question then becomes *when* to ask them. People can adapt to their life circumstances so that an evaluation of the health condition shortly after it is incurred may differ from a later evaluation.[50] A full discussion of whether adaptation should be included in tort damages lies beyond the scope of this paper, but this issue is heavily debated. On the one hand, compensating people for a lasting loss of enjoyment of life (so-called 'hedonic damages') while in practice they adapt to the new situation would result in excessive damages.[51] Proponents of this view note that incorporating adaptation would not imply that the victim should receive (almost) no damages at all. After all, even if there is no or only little hedonic loss, the victim may have lost a 'capability' for which he should receive damages: 'When people have lost a capability, they have lost something significant from the normative point of view, even if they have suffered no hedonic loss'.[52] On the other hand, if the victim learns to cope with his situation, lowers his expectation in life and over time forgets how it was to be fully healthy, this does not necessarily imply that the injurer should benefit from this adaptation through lower damages.[53] He *did* cause these losses, even if the victim has learned to live with them.

Setting this discussion aside, it should nevertheless be noted that QALYs elicited by 'generic' or 'quality of life' measures are able to incorporate possible adaptation but still reflect the loss of capabilities. For example an adapted paralyzed victim may indicate that he is 'happy' or 'somewhat happy' in the emotion-dimension of HUI3, while at the same time for ambulation

[48] Horsman et al., 2003.
[49] Brazier et al., 1999.
[50] Dolan, 2000, 1738-1739; Bagenstos & Schlanger, 2007, 763-765.
[51] See e.g. Sunstein, 2008, 160-166; Bagenstos & Schlanger, 2007, 748, 769ff; Ubel & Loewenstein, 2008, 198ff.
[52] Sunstein, 2008, 178. Also see Ubel & Loewenstein, 2008, 206ff.
[53] Menzel et al, 2002, 2151ff.

he may answer that he 'cannot walk at all'. The combination of answers to *all* questions in the HUI3 determines the QALY-weight for the specific injury. Damages based on QALYs could therefore reflect both issues. In Sections 5 and 6 below we will explain in more detail how QALYs could help in the assessment of pain and suffering damages.

5. Pain and suffering damages based on QALYs

The extensive QALY research provides information about the average QALY losses due to certain health impairments. Combining this information with the (expected) duration of impairments resulting from non-fatal accidents enables a relative ranking of non-pecuniary losses. This way it is possible to make an ex ante assessment of non-fatal injuries based on their severity and duration. Finally, to be able to estimate pain and suffering damages we need to know the WTP per QALY.[54]

Two basic approaches exist to attach a monetary value to the QALY. The first bases the monetary value of a QALY upon the cost of the last treatment that is implemented within a fixed health care budget.[55] An overview of the relevant literature shows that health treatments have been considered cost-effective and have been implemented when their cost lies between approximately €38,100 and €190,600 per QALY.[56] The so-called kidney dialysis value which is based on the consideration that kidney dialysis is a treatment which is (more than) worth its costs, poses a limit of about €84,800 to €108,900 for one QALY.[57] The National Institute for Clinical Excellence in the UK uses a lower limit of £20,000-£30,000 (about €24,800-€37,200) per QALY.[58]

The second approach that has been followed to attach a monetary value to a QALY involves obtaining people's WTP for a QALY.[59] One way to achieve this is by eliciting people's WTP for small QALY gains.[60] If for instance an individual is willing to pay €5,000 for a treatment that improves her health by 0.05 QALYs, then the value of one QALY for the individual is

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[54] In Health Economics, the final step to conclude the evaluation of different health treatments involves comparing them on the basis of both QALYs generated and costs incurred to implement them. See e.g. Johannesson & Weinstein, 1993, 466; Bleichrodt & Quiggin, 1999, 683ff; Dolan & Edlin, 2002, 828; Klose, 2003

[55] Phelps & Mushlin, 1991, 18; Johannesson & Weinstein, 1993, 466-467; Brazier et al., 2007, 276-277

[56] Kenkel, 2006, 421. He refers to Kaplan & Bush 1982, 74. The amounts in this section have been calculated first by expressing the amounts from the original American publications in dollars from 2014 (see www.bls.gov/data/inflation_calculator.htm), and subsequently in Euros on the basis of the 2014 Purchasing Power Parity (PPP) of the Euro area as published by the OECD: 0.777 (see stats.oecd.org/Index.aspx?DataSetCode=PPPGDP). Acknowledging the differences between the PPP of the Member States, the PPP for the Euro area is applied henceforth to avoid having to list separate amounts for all Member States.

[57] The kidney dialysis value that has been extensively cited is actually $50,000 per QALY. However since this figure has remained static for years Hirth et al., 2000, 333 provide upper and lower estimates that are more up to date.

[58] NICE, 2013, 66-67. The amounts are converted to Euro by using the annual average exchange rate of 2014 published by European Central Bank. UK pound sterling/euro=0.80612.
These amounts have been criticized as NICE has been using the same range of £20,000 - £30,000 as the acceptable cost per QALY for many years.

[59] Johannesson & Meltzer, 1998, 4-6.

[60] Robinson et al, 2013, 92-104.

€100,000 (€5000/0.05). This method, among others, has been applied in a European project under the name 'European Value of a Quality Adjusted Life Year' (EuroVaQ) which aimed at determining a monetary value of a QALY for ten European countries over the period 2007-2010.[61] According to the results, the overall mean WTP per QALY over all ten countries is at most approximately €69,000.[62] Another study from the Netherlands found the WTP for a QALY from a societal perspective to be between €53,300 and €85,000.[63] The alternative way used to derive WTP values for a QALY is to extrapolate them from existing WTP values readily found in VSL literature.[64] In an overview from 2000 where QALY values are based on VSL-research, an amount of about €304,000 is mentioned as a median value of the different estimates while 30 out of the 35 estimates exceed €57,300 for a QALY.[65] Miller assesses the monetary value of a QALY on the basis of a regression-based meta-analysis of 68 studies regarding the VSL and arrives at a value of about €186,100 for a QALY.[66] The 'European Value of a Quality Adjusted Life Year' project also estimated the value of a QALY by using country-specific VSL and average life expectancy and by isolating potential income effects. The resulting amounts were approximately €75,600 for the Netherlands and about €77,800 for the UK.[67]

In order to avoid confusion, it should be stressed that the above amounts only relate to the impact of the health impairments on the quality of life, namely the immaterial loss due to an injury, and do not incorporate pecuniary losses. In the EuroVaQ, for example, the following instruction was included: 'When you are thinking about what it would be worth to you to avoid this (the health state under consideration, LV/VK), please try to forget about any loss of income that might happen as a result of being in the [target] health state - please suppose that your income is unaffected - and just focus on how that state would affect your quality of life'.[68] If QALYs would be applied in the way we suggest, they would therefore only encompass non-pecuniary losses, not also pecuniary losses.

For our purpose of providing a basis for assessing the correct ex ante determined compensation for non-pecuniary losses, only the QALY values derived with the second monetization approach are relevant, especially the ones involving direct elicitation of WTP per QALY. The QALY values arrived at on the basis of fixed health care budgets under the first approach are submitted to constraints which are of no relevance for pain and suffering damages and hence they should not be used for their assessment. By combining the information available regarding the average QALY losses due to an injury with the amounts people are willing to spend for a QALY, we can arrive at the value of 'ex ante determined pain and suffering damages'.

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[61] EuroVaQ, 2010, 35ff.

[62] This amount resulted by using the 'direct approach' and an expected gain of 0.05 QALYs.

[63] Bobinac et al 2013. The amounts arrived at in the study lie between €52,000 and €83,000. These amounts are expressed in Euros from 2014 on the basis of the annual average inflation rates published by Eurostat.

[64] Johannesson & Meltzer, 1998, 5; Hirth et al., 2000, 335; Kenkel, 2006, 427.

[65] Hirth et al., 2000, 338-339.

[66] Miller, 2000, 161.

[67] EuroVaQ, 2010, 20-30. The original amounts in the publication (before adjusting for 2014 inflation) are €69,399 and €68,359.

[68] EuroVaQ, 2010, 50.

In the following examples, we use the QALY-weights provided by specialized QALY research, which enable an educated assessment of the QALY loss due to an injury.[69] The above overview makes clear that there is no consensus regarding a 'correct' monetized value of a QALY.[70] Factors that certainly should come into play when deciding which monetary value of a QALY will be applied for the assessment of pain and suffering damages are, among others, the results of ongoing research in health economics, the economic situation of a country, GDP and the input from consultation with insurance companies and other potentially involved parties like for instance consumer organizations etc. The amounts therefore may differ per country. Thus, although the monetary value assigned to the QALY is largely affected by research results, it will ultimately be a product of multilevel consultation and of political decision. Even though research results do not stipulate a single 'correct' monetized value of a QALY, the amounts arrived at by the EuroVaQ and by other researches provide at least the scope, within which the value of a QALY should lie. In the ensuing analysis, we apply a value of €50,000 per QALY to estimate pain and suffering damages for different injuries. We do not argue that this is the best possible amount, but until more research is undertaken to determine if a different amount may be better suited to assess pain and suffering damages, it makes sense to apply an amount that lies within the range of values stipulated by the most recent EuroVaQ project. A relatively high discount rate of 4% is also used to express future monetary amounts in present values[71] in order to avoid overestimating non-pecuniary losses due to inadequate discounting. The calculations in Section 6 serve as an illustration of the amounts of pain and suffering damages which would result from our estimation of a monetized QALY. We juxtapose these amounts to actual amounts awarded in several European countries for these health conditions resulting from personal injuries as a brief illustration of how the ex ante determined damages approach based on QALYs could be utilized.

6. Legal and economic standards compared

In this section, we illustrate the approach we propose by three concrete examples and we compare the resulting pain and suffering damages with the amounts which were actually awarded in several European countries.[72]

6.1 Amputation of foot and lower extremities

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[69] Our approach hence differs from Miller (2000), who suggests that in each and every individual case, experts should determine the QALY loss of the victim. We, on the contrary, propose to apply the general QALY weights as they can already be found in existing Health Economics literature. The costs of assessing the QALY weights in all separate cases in our view would be very high.

[70] See also Czabanski 2008, 45; Pinto-Prades, Loomes & Breij 2009, 553.

[71] Chan & Chan, 2003, 17; Weir et al., 2008.

[72] The amounts in this section are expressed in Euros from 2014 by using the annual average inflation rates published by Eurostat. For more examples, see Karapanou & Visscher, 2010 and Karapanou, 2014.

In England, the amounts that have been awarded as pain and suffering damages for amputation of one leg below the knee range between £81,259 and £110,320 (approximately €100,800 - €136,800).[73] In the Netherlands, a 31 year old motor driver whose lower leg was amputated received about €64,446 in a settlement, whereas a 54 year old woman whose leg was amputated just above the knee received €49,937.[74] Another woman received about €18,450 for the immaterial losses incurred after the amputation of her lower leg. She was able to alleviate her condition by using a prosthetic limb.[75] In Germany a trolley driver received €13,800 regarding the amputation of his forefoot for which he was comparatively negligent by 50%.[76] In another traffic accident case, the court awarded the amount of €44,300 for pain and suffering to a young woman who had her lower leg amputated.[77] In Greece, €194,000 was awarded to a 27 year old man after a car accident which resulted in the amputation of his leg right under the knee.[78] In another case, a minor received about €206,000 in pain and suffering damages for amputation just below the knee.[79] A 32 year old man who was involved in a work-related accident and had his lower leg amputated, received €68,900.[80] In Italy, a man received €154,000 in pain and suffering damages for amputation of his foot.[81]

There exists extensive Health Economics research regarding the cost-effectiveness of medication and other types of treatment for these health conditions, in which the QALY loss related to amputation of a lower limb has been elicited. Amputation of lower extremities is usually performed to patients of arteriosclerosis, whose lower limbs receive insufficient blood supply due to their arteries' blockage.[82] Diabetes patients can likewise be potential candidates for lower leg amputation, as diabetes may also cause a hardening of the arteries.[83] In a study it is investigated whether amputation of lower limbs or revascularization is more cost-effective to deal with vascular disease.[84] The QALY-weights relating to amputation of lower leg and revascularization are elicited by using the time trade-off from patients of vascular disease, who experience pain and difficulty in walking.[85] The QALY-weights of being cured after single or multiple revascularization are 0.95 and 0.9 respectively, indicating that there is a residual loss in quality of life even after the treatment, which relates to the experience of the vascular disease. On the other hand, the QALY-weight after incurring a successful amputation of the lower limb that restores the ambulation of the patient is 0.6. The difference between these QALY-weights therefore reflects the net loss incurred in quality of life due to amputation of lower limb, which

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[73] Judicial Studies Board, 2013, 59. The amounts are converted to British Pounds Sterling from 2014 on the basis of the annual average inflation rates published by Eurostat and converted to Euros from 2014 by using the annual average exchange rate of 2014 published by European Central Bank. UK Pound Sterling/Euro=0.80612.
[74] ANWB, 2015, 36.
[75] ANWB, 2015, 31.
[76] Jaeger & Luckey, 2008, 779.
[77] The plaintiff claimed €50,000 but because of the poor financial situation and the lack of insurance of the injurer, who was the boyfriend of the victim, the court only granted €40,000. Jaeger & Luckey, 2008, 776.
[78] Drama Court of First Instance 124/2004.
[79] Thessaloniki Court of Appeal 2601/2006, *Armenopoulos* 2007, p. 1921.
[80] Areios Pagos (Supreme Court) 961/2007.
[81] Corte di Cassazione (Highest Court of Appeal) n. 25751/2008.
[82] Harker, 2006.
[83] Ibid.
[84] Brothers et al., 1999.
[85] Brothers et al., 1999, 64.

ranges from 0.3 to 0.35. Other publications find the QALY loss related to amputation of lower extremities to be around 0.2[86] and 0.39 QALYs.[87] Another study found that the difference in QALY value between diabetes patients after primary healing of a foot ulcer and diabetes patients who have healed with major amputation is 0.29.[88] This QALY-weight indicates the net effect of amputation to the quality of life of the patients. The QALY-research was executed by sending an EQ-5D questionnaire to patients who had been treated for foot ulcers in the previous four years.

Applying a QALY-loss of 0.29 - 0.35 and a monetary value of €50,000 per QALY, with an average life expectancy of 80 years, the total loss in QALYs in a case involving a 54 year old victim like the one in the Netherlands, would result in a net present value of pain and suffering damages of about €246,000 – €297,000.[89]

6.2 Vertebral fracture / Spinal injury

In Germany €13,500 was awarded to a 30 year old man who suffered a vertebral fracture which resulted in a displacement of his spinal canal, whereas pain and suffering damages of €21,500 were awarded to a 65 year old woman for a vertebral fracture which resulted in a restriction of the spinal canal.[90] In another case, a 19 year old received €32,300 as well as a monthly allowance of €100 for pain and suffering damages due to multiple vertebrae fractures.[91] In the Netherlands, a 35 year old woman who suffered a severe vertebra fracture received €15,831 in pain and suffering damages, whereas a 45 year old man who suffered an impression fracture of a lumbar vertebra received €20,329.[92] In Greece a 36 year old man received €43,760 regarding multiple vertebrae fractures for which he was comparatively negligent by 60%.[93] The court took into account his serious remaining health problems and the permanent health impairment caused by the fractures.

Vertebral fractures are common injuries occurring as a result of car accidents, falls, sports etc. They usually cause temporary disability while their most serious complication is spinal cord injury, which can result in paralysis. There is extensive literature in Health Economics in which the costs and quality of life reduction for osteoporosis related fractures is estimated. In a study from 2006, the decrease in quality of life due to a vertebral fracture is assessed at 0.20.[94] For a person with a remaining life expectancy of 51 years (such as the case of the 30 year man from the German case) who suffers a vertebral fracture with remaining problems for the rest of his

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[86] Patel, 1999; CDA Cost-Effectiveness Group, 2002.

[87] Visser, 2003.

[88] Ragnarson Tellvall & Apelqvist, 2000, 238.

[89] The net present value of 27 annual payments of €14,500 resp. €17,500 (0.29 resp. 0.35 * €50,000), applying a discount factor of 4% equals €246,250 resp. €297,198.

[90] Hacks, Ring & Böhm, 2009, 329, 391.

[91] Hacks, Ring & Böhm, 2009, 598.

[92] ANWB, 2015, 83ff.

[93] Thessaloniki Court of Appeal 787/2009.

[94] Ström et al., 2008, 276. This QALY-weight is elicited from patients using the generic measure EQ-5D 24 months after the fracture occurred. When patients were asked only four months after the injury, the reported decrease was 0.26. This difference in our view may reflect adaptation by the patients.

life, applying the €50,000 dollar estimate per QALY would result in pain and suffering damages of about €225,000.[95] However, if the fracture is expected to heal completely after some time so that the immaterial loss experienced is only temporary, pain and suffering damages based on the QALY approach can also reflect this. For a person incurring a vertebral fracture which is expected to heal in two years, pain and suffering damages would amount to approximately €19,600.[96]

6.3 Loss of an eye

Pain and suffering damages for the loss of an eye greatly differ per country. In England, the amounts that have been awarded for the complete loss of sight in one eye range between £45,482 and £54,398, i.e. approximately from €56,400 to €67,500.[97] In the Netherlands, a 17 year old was hit in the right eye with an air gun and incurred total loss of sight. He received an amount of €26,557 for pain and suffering.[98] In a work-related accident, a 24 year old received €18,007 for loss of an eye.[99] In Germany a woman who suffered from inflammation of the cerebral membrane due to her contact lenses and was blinded to one eye received €22,100 in pain and suffering damages.[100] A much higher amount of €138,500 was awarded to a 12 year old boy. He lost an eye in an accident for which he was found comparatively negligent by 1/3. The fact that he has lost an eye at such a young age, which forces him to constantly be careful in order to protect his remaining eye, has increased the award granted.[101] In another case, a 15 year old was granted €15,000 for losing sight in the right eye.[102]In Greece, a 43 year old mother of two received about €103,300 in pain and suffering damages for complete loss of vision in her left eye.[103] In another Greek case, €97,000 was awarded to a 36 year old man who was injured to one eye by a flare and lost 80% of his vision[104]. However, a 46 year old Greek man whose left eye was destroyed after someone kicked him in the face only received about €36,400.[105] In Italy, the court of Pisa awarded €156,000 to a 43 year old man who lost sight in his right eye in a hunting accident.[106] In another case, a man incurred a retinal rupture of his right eye during practicing kung fu. Eventually, vision in the injured eye was lost despite the

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[95] The net present value of 51 annual payments of €10,000 (0.2 * €50,000), applying a discount factor of 4% equals €224,821. Note that if we would apply a QALY loss of 0.26 in the first year or in the first two years, to reflect that adaptation has not yet taken place the total amount would be about €3,000 (one year) resp. €6,000 (two years) higher.

[96] The net present value of 2 annual payments of €10,000 (0.2 * €50,000), applying a discount factor of 4% equals €19,615.

[97] Judicial Studies Board, 2013, 16. The amounts are converted to British Pounds from 2014 on the basis of the annual average inflation rates published by Eurostat and converted to Euro 2014 by using the annual average exchange rate of 2014 published by European Central Bank. UK Pound Sterling/Euro=0.80612.

[98] ANWB, 2015, 65.

[99] ANWB, 2015, 64.

[100] Jaeger, & Luckey, 2008, 441.

[101] Jaeger, & Luckey, 2008, 423.

[102] OLG Koblenz 18.3.2004 5U 1134/03 NJW-RR 2004, 1025.

[103] Simvoulio tis Epikratias (Council of State) 2739/2007.

[104] Athens Administrative Court of First Instance 3441/2006.

[105] Dodekanese Court of Appeal 307/2005.

[106] Tribunale di Pisa (Pisa Court of First Instance), 1 July 2009, n.189/2002 R.G.

effort and the eye surgeries he underwent in the meantime. The court granted him an amount of about €73,500 plus interest since the date of the vision loss.[107]

Losing sight in one eye may be the unfortunate outcome of an eye injury, as illustrated in the cases above or it may result from a disease that affects the eye such as cataract, diabetes, glaucoma *et cetera*. There exists extensive Health Economics research investigating the cost-effectiveness of surgery and other types of treatment for these health conditions. In a publication from 2001, Brown et al. investigate whether people with good vision in both eyes have a higher quality of life than people who have good vision only in one eye. According to the results the difference in quality of life between good vision in both eyes and good vision in one eye is 0.08.[108] This estimate regarding the difference in quality of life between good vision of both eyes versus good vision of one eye only has been corroborated in other studies.[109] From yet another publication regarding cost-utility analysis of cataract surgery we see that the QALY gain of a cataract surgery to the second eye after a successful treatment of the first eye is assessed at 0.109 per year.[110] We use the QALY-difference that was corroborated in several studies, namely the difference of 0.08 between seeing with one eye and seeing with two eyes as an estimate for the loss of the quality of life if one loses sight in one eye. For a person with a remaining life expectancy of about 37 years (such as the 43 year old man from the Italian case), applying a monetary value of €50,000 per QALY would result in pain and suffering damages of about €77,500.[111]

7. Conclusion

In our view, the conclusion from the insurance theory that non-pecuniary losses should not be compensated because a rational victim is not willing to self-insure against such losses neglects the fact that people *are* willing to spend resources on reducing the probability of suffering such losses. Ex ante damages are an expression of this WTP. In the Law and Economics literature, the Value of a Statistical Life is used as an example of such damages, but this literature does not offer a way with which ex ante damages for non-fatal accidents can be assessed. We think that QALYs offer this systematic framework for assessing pain and suffering damages.

When comparing the results of the proposed approach with awards that are actually awarded in Germany, Italy, Greece, England and the Netherlands, it turns out that the QALY approach results in (much) higher amounts. The QALY approach enables a better 'relative ranking' of injuries than the current legal methods. We believe that information about the quality of life derived by specialized research forms a better basis to determine pain and suffering damages than the amounts previously granted by courts. QALYs in our view are therefore able to improve the legal approach to pain and suffering damages for personal injuries, as well as the way in which Law and Economics handles such non-pecuniary losses.

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[107] Cassazione Civile sez. III (Supreme Court section II), 21 April 2011, n. 9147.
[108] Brown et al., 2001, 644.
[109] E.g. see e.g. Clarke, 2002.
[110] Busbee et al., 2003, 2310-2317.
[111] The net present value of 38 annual payments of €4000 (0.08 * €50,000), applying a discount factor of 4%, equals €77,471.

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