The Economic Accident model, Uncertainty and The Theorem of Coase.

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1 Introduction and delimitation of the issue.

“For me the most interesting aspect of the law and economics movement has been its aspiration to place the study of law on a scientific basis, with coherent theory, precise hypotheses deducted from the theory, and empirical tests of the hypothesis. Law is a social institution of enormous antiquity and importance, and I can see no reason why it should not be amenable to scientific study. Economics is the most advanced of the social sciences, and the legal system contains many parallels to and overlaps with the system that economists have studied successfully.”

The above apposite words by Judge Richard Posner were chosen to be quoted as part of the introductory words in the fifth edition of the well-known and highly respected book Law & economics by Robert Cooter and Tomas Ulen. It is not hard to see why this powerful quote was hand-picked. I cannot think of a better way to depict the integrative relationship between the discipline of law and the one of economics.

This thesis is going to be a comprehensive study of a selection of relevant issues naturally presenting themselves within the field of law and economics. The subject of law and economics beautifully illuminates the important interdisciplinary between microeconomic theory and traditional law and legal rules. This multifaceted nature is exactly what intrigued me to write my thesis within this field.

I am of the belief that the traditional subject of law could benefit immensely on both a normative and a theoretical level from further development and study of field of law and economics. Within the five years long integrated Master’s of Law programme at the University of Oslo the subject field of law and economics is currently only a semi-obligatory subject worth the modest value of ten study point. Put differently, the subject is not currently a substantial or even obligatory part of the Norwegian legal education. By writing this thesis I want to highlight the general value of the subject field of law and economics, and define the normative and descriptive insight it provides in the various fields of the legal system. There is utility and power to be derived from this subject field for the process of court cases, rule creation, legal decision-making, security under the rule of law, fairness considerations and the general competence of legal practitioners & decision makers to mention a few principal areas.

It is well-known that the subject of law and economics is a specialized and widespread field within American law.
The subject is thoroughly incorporated into the American legal system in a variety of different arenas. Many prestigious American Law-schools offer tailored joint-degrees and cooperative programs in law and economics, and place great emphasis on the growing importance for legal practitioners to be able to comprehend and utilise economic theory and understanding within

the practice of traditional law in a multitude of legal areas. Most well-known and influential Law & economics literature is furthermore written by American economic and legal scholars. The incorporation of law and economics has furthermore been explicitly undertaken in American courtrooms as early as 1947, beginning with the famous case of United States vs. Caroll Towing Co. In the ruling of this case Judge Learned hand promulgated the explicit use of law and economics, by coining The Learned Hand Formula. The Learned Hand formula has since been refined and repeated many times in American courtrooms.
The above-mentioned trend and practical incorporation of law and economics cannot be said to have hit the Norwegian legal domain with a comparable force, or more generally speaking; any other similar civil law system in Europe. It is this observation of a need for an increased embracement of the field of law and economics that I want to make as one of the underlying propositions of this thesis. It is my aspiration to further elucidate the enduring importance, value and significance of this subject. To further this ambition, selected issues from traditional law and economics theory will be investigated in depth from a theoretical angel and subsequently tied to practical implications for civil law.

The literature used for this thesis is mostly written by American law and economics scholars. However, even though most this literature is written from a common-law perspective, one of the propositions maintained is exactly that valuable inspiration and insight both should and could be obtained from American literature. The literature should be equally generalizable to a civil law system both theoretically and in most cases also pragmatically.

Although there are many sub-areas of law that presents interesting law and economic related issues suitable for study, specific emphasis will be dedicated to the field of tort liability law. The main part of the thesis will focus on the distinctive and similar features of the two main types of option protection for entitlements of agents relevant for the economic theory of law. These are the protection institutions of property rules protection and liability rules protection. The Theorem of Coase\(^2\) will play a central role in the subsequent comparative analysis and discussion of the two options for protection. The theorem will assist in illumination of the different implications under the two institutions of protection. As will become apparent, property right protection can be viewed as superior and stronger protection option for the entitles agent. Liability rules protection on the other hand is the slightly weaker protection option despite its noble ambition of restoring the injured agent to a state of ‘as if’ the injury never occurred. The analysis of this topic will take advantage of a prominent and realistic example of two agents having conflicting interests in one common natural resource. The use of this example is hoped to present a better insight of the co-existing intertwinement and important differences in the two methods of rights protection. From this skeleton framework of the thesis, various advancements, variations and extensions will follow in subsequent chapters.

One of the extensions that will be undertaken and discussed is the introduction of legal uncertainty and its implications for the unilateral accident model. The introduction of the uncertainty element will subsequently serve as motivation for a further advancement of introducing strategic uncertainty into the bilateral accident model framework. In relation to this

concept, game theory will be brought more explicitly into the bilateral accident model analyses. Game theory already implicitly underlines the positive economic theory in terms of the actors’ incentive structures and decision problems. The principles of game theory are easily observed as consistently in line with the previous analysis conducted of the incentive structures of the different liability rules. One could conduct the positive economic analysis of the liability rules within an even more pronounced game theoretic framework than has been common practice within law and economics literature, and I believe that this approach may yield benefits of explicit comparison of the relative optimality of the agents (injurer and victim’s) different optimal strategies which will be shown to contain Pareto efficient choices. An in-depth game theoretic approach will also make more conspicuous the interdependent relationship of the actors, and show how their strategies end up in Nash equilibriums.

An underlying sub-theme throughout this thesis will be the question of whether there is a possibility to enhance or improve the predictability of tort liability cases will be analysed both within a theoretical framework and a normative one. There is a widespread consensus that when it comes to tort liability negligence cases, these arguably generally suffer from the most severe unpredictability. On a normative level, a pressing question follows of whether there is a way to influence the theoretical implications of law and economics into a real-world setting of a civil law court system. The Norwegian civil law system will purposefully not be of specific focus in this thesis, and the implications and propositions are instead aimed at being generalizable to any civil law system including the Norwegian one. Notwithstanding, relevant examples from the Norwegian legal system will occasionally be employed where appropriate.

The origin of the uncertainty and unpredictability of the negligence institution will be inspected from different angles, and specific focus will be dedicated to the ‘reasonable man’-concept of negligence. The reasonable man-standard is a commonly occurring and utilised measurement of negligence in many civil law legal systems including the Norwegian one. It will be claimed that the widespread multidisciplinary of sources used by the court in their determination of their negligence institution is not by any means objective and unequivocal, and intrinsically suffers from subjective discretion at the hands of the court. The consequences of this proposed uncertainty and unpredictability is that potential agents will have difficulty in foreseeing their legal status due to the inaccessibility of the negligence institution. Not being able to predict their legal standing will arguably weaken a legal system’s security under the rule of law – a concept which in most societies is regarded as one of its most fundamental and desired objectives. Additionally, uncertainty and inability to adequately presage a legal outcome will according to the classical economic theory of precaution distort rational potential agents’ incentives for behaving in a manner that leads to social optimality measured as Pareto Optimality. It is this economical angle which will receive the most attention and in-depth analysis throughout this thesis.

A non-economical concept of the ‘reasonable man’ is inherently vague, whereas a concept of Pareto efficient ‘social optimality’ is easier to objectively quantify. Neither the wording nor the jurisprudence within negligence liability law cases provide convincing arguments in terms of stability and certainty for the negligence rule norm determination. The reasonable man standard
is derived from including, but not limited to: provisions of law, industry norms, the judge’s subjective “common sense” or discretionary view, jurisprudence, legal scholarly literature etc. Indeed, the possible and potential sources from which the court determined negligence standard is determined in real life negligence cases are many and widespread. The natural question to follow is whether this given multidisciplinary of sources from which the court-determined due care standard is derived from, cause unpredictability and uncertainty amongst potential injurers and potential victims. Economics and law scholarly does indeed seem to annunciate such a consequence. Could it be argued that if the negligence standard applied in an ex post manner by the court was more predictable ex ante, that the potential agents were in a better position to anticipate its own legal position? Could it not also be argued further that for agents to be able to adumbrate their own legal position is part of a higher meta-objective and legal pillar of security under the rule of law? During this thesis, it is hoped that these latter questions will be given prominence to as an underlying but at the same time cardinal issues.

Any conceivable method contributing to greater certainty in legal norms, a higher degree of predictability for potential legal subjects, and thereby arguable a strengthening of the security under the rule of law-concept in a given legal system, would be great value-added both on a normative and a practical level. One proposition that will be discussed during the course of this thesis is a replacement of the traditional ‘due care’ evaluation based on widespread, unquantifiable, hard to define, subjective and discretionary sources. The proposed replacement for the traditional source of the negligence norm determination is a comprehensive and extensive economic accident model. Such an economic accident model has many benefits when implemented in a real-life setting. The proposition will be made that one of the most important of these benefits is that by implementing such an approach a court could achieve a more predictable and certain due care standard for potential agents. The increase in the certainty in the due care standard predicted to result from such a hypothetical transition to a more economic-based due care calculation is a direct consequence the indwelling objectivity in the subject matter of mathematics and economics. Furthermore, within the economic accident model formalistic variables are used that by their definition are less likely to suffer from subjective interference. For instance, a potential agent’s pecuniary value of precautionary measures compared to a pecuniary socially optimal/Pareto efficient level are less likely to be influenced by a court subjective opinion’s than is a comparison of an agents’ actions to for instance “a reasonable man’s” actions.

An economic accident model could be utilized by a court to both predict the actions and calculate the optimal due care level of the potential agents. If an economic model of liability for accidents could be incorporated into the real-life workings of a court system, one could expect the court determined negligence norm to be more accessible and predictable for potential agents. One could of course also argue that the common potential agent, be it either a victim or an injurer, is not likely to be well versed in economics and the court determined negligence norm could arguably be even more inaccessible. However, such a critique is not obliterating. Even if the common man is not likely to possess expertise in economics and economical mathematics, one could argue that the objectivity of numerical and pecuniary values still stands. Despite the arguably difficult task of calculation for an average potential agent with no
economical or mathematical background, such an agent could find some solace by knowing that a competent court would calculate his actual precautionary level correctly with no subjective or discretionary interference. As a follow-up on the latter point about the competence of a hypothetical court in relation to the incorporation of an economical accident model in negligence cases, this thesis will investigate the possibility of mandatory incorporation of an expert panel/expert witnesses of mathematical economists in negligence cases ensuring the calculation of the necessary variables utilised in the model are as correct as possible.

Although much analysis and discussion is devoted to the negligence rule, this will not be the sole focus of the entire thesis. As will become evident throughout this thesis, it is not only within negligence court cases that an economical accident model approach could provide increased certainty and arguable thereby a higher level of security under the rule of law. Also in cases of strict liability and other institutions of tort liability will an economical approach add value. The value is however expected to come in at an earlier stage in the legal process in regard to these other liability grounds. The stage at which the economic accident model is most relevant for the other liability grounds is at the ex-ante norm creation stage, not its application stage. By utilizing the working mechanisms of the economic accident model, it is possible for the law-makers to create even more spot-on efficient rules. Of course, for the sake of comprehensibility, this thesis is obliged to restrict itself to one delimited social goal as a measure of efficiency. Throughout the entirety of this thesis this goal/objective is going to be social optimality or Pareto efficiency in economic terms. Pareto efficiency/optimality is chosen as a delimited objective because of its very definition and its inherent appeal: “an allocation where there can be done no improvements making at least one agent is better off without making at least one agent worse off”.

The end part of this thesis will take a slightly more unconventional turn and dive into a more periphery sub-field of law and economics namely the one of behavioural economics. The motivation for this development is additional accent of the complexity surrounding the incentives of economically rational agents. The importance of this field for the traditional law and economics doctrine should not be made light of. Behaviour economical thoughts are not a new phenomenon, but as will be explained in more detail during this thesis, the experimental contributions of Tversky and Kahneman permanently put the subject on the map of economists - both supporters and sceptics. I personally believe that behavioural economics has great significance for the field of law and economics, and that there is much value to be derived from making behavioural economics a more unequivocal feature of traditional law and economics scholarly. As was suggestively coined by the innovative wealth manager and economist Kirk Chisholm: “Human Nature is not a problem that can be fixed by rules and regulations. All solutions to the existing problems must be based on how people behave, not on how we think they should behave.”

The observed irregularities of behavioural economics of the Endowment effect and the Hindsight Bias, will be presented and discussed in relation to the traditional economic accident model and the Coase Theorem. These theories more general signification and implications for traditional law and economics will follow as topic of study.
The important distinction between property rule protection and liability rule protection.

As mentioned in the introductory remarks of this thesis, the main issue of this thesis, and also its starting point of analysis, will be the distinction of the two main forms of entitlement protection relevant for the economic theory of law. The Theorem of Coase will here come to play a central role within the subsequent comparative framework for analysis. From this part and the analysis under subsequent chapters will follow where an attempt is made to introduce valuable advancements and spin-offs.

The Coasian mechanism is meant to provide insight into of the dissimilar and equal implications under the two institutions of protection. As stressed before, property right protection can be viewed as superior and stronger protection option for the entitles agent. This is because property rules protection always will favour the initially best positioned agent. Liability rules protection on the other hand, is the slightly weaker protection option despite its noble ambition of restoring the injured agent to a state of ‘as if’ the injury never occurred.

There are various reasons for why the more extensive protection option of property right protection is not always chosen as the form of legal protection. According to the logic stressed in this section of the thesis, it seems almost counterintuitive that liability rule protection being the weaker form of entitlement protection, would ever be the preferred protection option in any area of law. However, as will become evident throughout the subsequential discussion to come, one of the main reasons for this prevalence is related to the level of transaction costs in the respective setting. A widespread consensus seems to be that in areas of law with expected high transaction costs, it is not feasible to utilize the property protection option due to the working mechanism of the Coase Theorems’ requirement of an absence of such costs. Areas of law where liability law protection is the chosen form of protection are therefore apparently those where transaction costs are expected to be too high for market mechanisms to work efficiently. However, during the discussion to follow, this latter proposition will be challenged. Instead the proposal will be presented that the areas of law where liability protection has been selected, not necessarily has to have the feature of high transaction costs. Rather, these areas could be

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structured in a way likely to inhibiting the features of low transaction costs, in which case move to a market based property rights protection institution would be a better option in terms of heightened protection for agents.
3 Conflicting interests of agents in regard to a given shared natural resource.

In order to highlight the issue of discussion for this section a simple example with an accompanying graph figure will be used. The example to be used will focus on two agents A and B, who for this purpose are assumed to be two different businesses. The agents have conflicting interests in a single common natural resource, which in the example will be assumed to be a river. Agent A is the polluter, and agent B the pollutee. Agent B is also for simplicity assumed to be the only affected party by the other agent’s emission of pollution in the common river. Agent A uses the river as a receipt for its pollution wastage, and this disposal (pollution receipt of the river) has a given value to him. The value for A will be denoted as ‘emission valuation’. The denotation $e$ in the graph represents the emission magnitude from A, given in some appropriate unit measure. The issue of analysis for this section will mainly be focused on agent A’s marginal emission valuation and B’s corresponding harm from this emission/pollution. The denotations used for these measures are $MEV_A$ and $MEV_B$. With the use of these marginal valuation and harm curves the two agents ‘best responses’ will be analysed and compared under different regimes. The regimes (systems) looked upon will be total right to pollute, fixed tax system and perfectly competitive market for trade of emission quotas.

It is of importance to reiterate the Pareto Efficiency measurement because this is the efficiency measure that is used consistently throughout this thesis to represent the socially optimal situation. Pareto efficient situations are present where agents via Pareto improvements move from an initial situation to a new situation. During this move at least one agent must find the new situation just as advantageous as the previous, and at least one agent finds the new situation better (an improvement) from the old. Pareto efficiency will be manifest by there being no more Pareto improvements feasible for the agents (see figure below). The latter situations, both the Pareto improvements and the final unique Pareto efficient situation arrived at via trade, can both be illustrated by the use of an Edgeworthbox. The Edgeworthbox is chosen because it illustrates how initial endowments of the two agents, their consumption bundles and the mechanism of frictionless trade all interact and lead to Pareto improvements and Pareto efficient situations (consumption bundles).
Figure A.

Figure B.

Before discussing the more simplistic diagram with the two agents’ $MEV_A$ and $MEV_B$ curves, an externality type of Edgeworthbox can highlight their conflicting interests in the natural resource from a slightly different angel. By the use of this type of Edgeworthbox, the assumption is that the two agents, A and B, have preferences that are conflicting and going in opposite directions.

It should be noted that the Edgeworth box in this section may be coined the ‘general type’ Edgeworth box. This is because this box illustrated in this section, is the depiction of the more general situation of non-quasilinear preferences. The latter is a more commonly occurring scenario than the converse of quasilinearity which will be discussed in a later chapter. This general type of Edgeworth box has substantial wealth effects in terms of the respective agents and their initial endowments. However, the quasilinear type of Edgeworth box also has this property of wealth effects dependant on starting point. The differing feature of the two types of Edgeworth boxes is that under the general type of box, the initial starting point will be determinative of the final equilibrium use of the recourse. This latter quality of variable final equilibrium of the respective use of the resource in question, is not found in the special type of quasilinear preferences type of Edgeworth box that will be presented later.

A. is assumed to be the polluting business, and obtains a value from the pollution of the river, and agent B obtains discomfort/harm from this same pollution. Thus, Agent B obtains a more preferable position in the Edgeworth box simultaneously as A. reduces his pollution emissions into the river. The assumption of the box is that both agents have different preferences in terms of the two variables money and pollution emissions. As stressed above, only agent A as the polluter business has a positive preference for pollution emissions. He obtains a value from polluting the river, maybe using as a cheap disposal method for toxic wastage created from his production of something. Agent A also has a preference for the box’s other measurement variable money of pecuniary value. Likewise, agent B also has a preference for money, but in contrast with A’s preferences, he also prefers non-polluted river water. B is made better off when A reduces his pollution emissions and thus reduces his consumption of the “good” water measured on the vertical left axis of the box. This is because the water-good harms B. The vertical line denoted EE’ depicts a situation where the two agents have the same amount of money so that their initial endowments are bound to lie somewhere on this line. The exact point at where these endowments are positioned is dependent on the legal structure which again will determine the initial endowment of the clean river water for B and the right to emit pollution for A. A random initial endowment of the legal rights could for instance be full right to pollute for agent A. In this situation, A is free to pollute as much as he wants which under the assumption that he is an economically rational agent, will be the amount where marginal valuation of pollution equals zero.

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In the following, different protection options will be analysed within the frameworks of the Edgeworth box. The subsequent analysis will start by property rights protection as a way to make the externality internalized and follow up with the option of liability rules protection.

### 3.1 Property rules protection illustrated within the Edgeworth box.

Under the assumption of property right protection for A’s full freedom to pollute, he may freely choose to engage in trade with B for some or the entire amount of the pollution units. He may also choose to keep the entire right to pollute to himself. In the converse scenario of full right to clean river water for agent B, the same of course holds true with regards to freedom to trade the right or conserve it to himself. This ‘freedom of contract’ for the holder of a right is an important distinguishing feature of property right protection and liability right protection.

The two different endowments situations are depicted in the Edgeworth box as “endowment E” and “endowment E’”. A random pecuniary value of 100 will be assumed for both agents at their initial endowments. Under the initial endowment scenario of E, the consumption bundles are respectively (100,0) for agent A, and (100,0) for agent B. The consumption bundles illustrate that both agents are endowed with a pecuniary value of 100 and (assuming no trade takes place) there would be zero pollution since the right to clean river water lied with B. The initial endowment is not assumed to be Pareto efficient, and a there is thus room for mutually advantageous trade between A and B to take place. B. may trade away some or his entire right to clean river water and in exchange obtain a pecuniary amount from A as compensation. Point X. in the box as an example of this scenario.

Under the converse initial endowment scenario of E’ where A. owns the full right to pollute the river water, the same remarks apply. Under the assumption that this endowment is not Pareto efficient, mutually advantageous trade may take place between the agents. B might buy his freedom from some or all the pollution emission of the river water at a price set by A, and a move to a Pareto efficient new endowment for the agents can be reached at point X’ in the box.

Regardless of the initial allocation of the property right, the premise is that trade would converge their initially endowed rights that by assumption where Pareto Inefficient, to a mutually advantageous endowment point that is Pareto efficient. This new point will be located at the tangent points of equal marginal rates of substitution between river pollution and money that is the conditions of Pareto efficiency.

One important remark to be made about the respective Edgewothonbox representation is that both E and E’ are economically efficient in terms of Pareto efficiency. If the distributional effects of the agents are ignored, the two points denoted in the box are identical in terms of economical

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efficiency. In the above diagram, only two different possibilities of Pareto Efficiency are denoted and have been discussed. However, there are many more possible points of Pareto efficient endowments along the contract curve.

As should be apparent from the usage of the Edgeworthbox illustration, the agents initial Pareto-inefficient endowment of the two goods is not at all a hurdle for Pareto Efficient endowment to occur via mutually advantageous trade at a later stage. The conditions stressed by the Coase Theorem should however be assumed for this to be a feasible scenario. The rights should be clearly defined, be freely tradable, and transaction costs should be negligible. Under these rather ideal conditions, the initial endowment of rights is irrelevant.14

The Pareto efficient endowments are reached through voluntary mutually advantageous agreements between the two parties. The exact mechanisms for these agreements might be many and are not necessarily limited to the Coasian mechanism. One possibility that can be exemplified is the market mechanisms of perfect competition. In this specific example scenario one could imagine a market for pollution emission rights with many agents interacting in the market. In this scenario it is possible to imagine a market fulfilling all the conditions for a perfectly competitive markets for the specific rights to pollution emission. These rights could be traded at a market price that would be the competitive equilibrium. The competitive equilibrium will also be the Pareto efficient one. A real world success story illustrating this market mechanism in practice is the ‘cap and trade’-approach designed to reduce the emissions of harmful pollution into the atmosphere.15 The latter approach is analogously designed in its working mechanism to the described mechanism of the perfectly competitive markets resulting in Pareto efficiency. It is of course assumed that the total “cap” is set efficiently from the regulators side.

There are clear similarities between the system of trading of rights that producing negative externalities, and the trade within the field of producer and consumer theory in microeconomics. Producer and consumer theory can therefore provide valuable economic insight into the pollution externalities field. However, just like within the classic producer and consumer theory, the conditions that must be assumed under these theories are unrealistic in comparison to a real-world setting. This is a general weakness of all theories and theorems, and should not (in my opinion) bleak either their descriptive or normative world force of reality.16

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15 https://www.edf.org/climate/how-cap-and-trade-works
4 Closer inspection of the working mechanisms within the Edgeworth box and the pertinent importance of the core – concept.

Before the transgressing of the analysis to the liability rules protection option within the Edgeworth box framework, is felt beneficial to provide a closer inspective look at the working mechanisms within the box and especially the importance of the concept of the ‘core’.

The core concept within the Edgeworth box depicted on the following page (figure C), is illustrated by the green small curves within the lens-shaped sections created by the agents’ indifference curves. Within the general situation Edgeworth box, the contract curve (drawn in pink) will go through all the Pareto efficient-points, and thus illustrate that these points in the box are dissimilar. All the different Pareto efficient points involve a different combination of the consumption bundles. The initial consumption bundles change through the Coasing mechanism in the core, and result in Pareto efficient final consumption bundles. The composition of the final Pareto efficient consumption bundles is dependant of the initial staring point in the box. The initial starting point is again dependent on the initial allocation of rights.

Within an imagined market for emission pollution rights, such as the cap and trade solution, where the conditions for perfectly competitive market are satisfied, the Coasing mechanism in the core would take place on the perfectly competitive price line as shown in the diagram as the red line. If the condition of perfect competition is not satisfied, the Coasing on the Core would be dependent on bargaining strength and initial endowments of the respective agents.

A situation between agents that mimics the conditions of perfect competition is a scenario with a high number of agents. It is often inferred from the Coase mechanism, and its requirement of low transaction costs, that if the scenario is one with many agents interacting, this might be synonym to high transaction costs. Thus, the classical prediction in such a situation is that the mechanisms of the Coase theorem would be hindered. However, it is possible to look at this scenario from a slightly different angel. Instead of looking at the high number of agents as a disadvantage, one could image this scenario as an ideal condition for the creation of a perfectly competitive market. In this imagined situation, the mechanism of Adam Smith’s invisible hand could be thought of as ‘leading’ the agents in the Edgeworth box up the perfectly competitive price line and into the core solution.

In contrast to the general situation Edgeworth box, the bundle of allocation will be the same along the entire contract curve under the special situation Edgeworth box, final bundle of allocation will be the same along the entire contract curve.
5 Quasilinear Preferences and the Coase Theorem.

Unlike the situation described above where the exact position of the endowments is dependent upon the legal structure of property right assignment for pollution/non-pollution, there exist a situation where this position is entirely independent of such. These situations are known in economics as quasilinear preference solutions, and are characterized by the very fact that all Pareto efficient solution has the same unique location on the ‘possible endowment lines’.

When many efficient points are looked upon such as illustrated in the Edgeworth box, quasilinear (hence their name) solutions are depicted as a horizontal line drawn though all the indifference curves mutual Pareto efficient points. This quasilinearity is translated, as the endowments of the respective agents in terms of the negative externality having to be the same (identical) in all Pareto efficient solutions. The other preference of money measured on the horizontal bottom line of the box, will however be different in the various efficient endowment points. The quasilinear preference condition of externalities is identical to the predictions of the Coase Theorem.

As has been reiterated several times throughout this thesis, the Coase Theorem proposes that the initial allocation of rights is irrelevant in terms of a unique and Pareto efficient amount of a given externality. The single unique Pareto efficient amount of the externality will only be realized if the classical Coasian conditions of negligible transaction costs and freedom for trade are satisfied. What might become even clearer with the use of the Edgeworth box is the fact that the distribution of the preference for money is variable across the efficient endowments (allocations), unlike the preference for the negative externality that is identical across these. As highlighted by many scholars, the many conditions of the descriptive Coase Theorem are very rarely fulfilled in a real-world setting. The Coase theorem may not only be unrealistic in terms of its assumption of negligible transaction costs and well defined property rights, but also in its implicit assumption of the impact of the income effects in the quasilinear preferences case being inconsequential in in terms of efficiency. At least this might be true if we make the distinction of a short run and a long run perspective. It is a possibility that the income effects in the quasilinear case feed back into the economy in the long run. This again could impact the equilibrium use of the resource in question in a long run perspective. The quasilinear situation requires that the distribution of income between the agents must be inconsequential to the demand for the negative externality preference. The normal interpretation of the income effect within economic consumer theory is that that as the income of an agent (consumer) increases, the demand for goods whose production causes externalities will increase as well. In any case, it seems reasonable to infer that the consequences of the income effects in the quasilinear case in the long run, at best is variable across different types of negative externalities. The implicit assumption that the preference for the negative externality is unchanged in the quasilinear situation even in a long run perspective is at best unrealistic. Notwithstanding, the Coase Theorem should not be rejected purely on its analytical grounds. By describing unrealistic and rigid conditions for uniquely Pareto efficient solutions of externalities to occur, it also exposes the weaknesses that might be present and thus to some extent remedied in real life settings. For
instance, if income effects are thought to pose a problem in a real-life situation of a negative externality, policies might be adopted to try to reduce these wealth effects, and thus better facilitate the conditions for quasilinear preferences of a given externality in the long run. The same is undeniably true for the other conditions of the Coase theorem such as transaction costs and well-defined rights. These too both should and could be attempted remedied by a regulatory body.
6 A functional analysis of the legal norms.

Up until now, the main framework for analysis has been an Edgeworth box, both in its general form and its more specialized form. The Edgeworth box is in my opinion a very illustrative and rich economic framework to conduct analysis within. However, from this chapter on, the framework of the Edgeworth box will be left, and replaced with the slightly more simplistic classical economic accident model that is commonly found in law and economics literature. I have chosen to base the following analysis on the one presented in The Economic structure of Tort Law” by Landes and Posner, (1987). In this chapter, the economic accident model will be applied to the different liability rules in a functional manner. The economic accident model that will be utilized in the following analysis of the legal norms can be seen in both a bilateral and unilateral framework and will therefore be treated in a juxtaposed manner.

The Coase theorem states that the Pareto efficient and socially optimal investment in precautionary measures of the respective values of x* and y*, would result through the mechanism of voluntary mutually advantageous agreements between the agents. The working mechanism behind this latter effect was shown in a previous chapter in relation to the property rules protection institution within the Edgeworth box. The motivation for this chapter is that in terms of internalization of an externality (which was the topic of analysis in the previous chapter), liability rules could function as a ‘pseudo form’ replacement of the mechanism of the Coase Theorem and thereby produce identical results as would have resulted under the ‘voluntary version’ of the theorem. An even more fitting way of describing this latter function is to look back at the general type of the Edgeworth box in the previous chapter of property right protection. One may thus observe the ‘optimal incentive creation’ of the liability rules as a type of ‘invisible force’ (similar to Adam Smith’s invisible hand concept), leading the agents into the ‘core’-solution resulting in Pareto efficiency. Important to note is that the subsequent of the various liability rules is carried out within the framework of factual uncertainty, which is illustrated by the presence of the p-component in the economic model.

The outline of the liability rules analysis to follow is based upon the following propositions: The socially optimal precautionary level is given by the values that minimize the respective function of $L(x,y) = p(x,y)D + A(x) + B(y)$. A is the potential victim agent and B is the potential injurer agent. x is the denotation used for A’s inputs of care, and y for B’s inputs of care. The factual uncertainty variable of p is dependent on the variables of x and y, $p = p(x,y)$. By definition, x* and y* are the unique values that minimize the equation for social costs of a potential accident $L(x,y) = p(x,y)D + A(x) + B(y)$.

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7 The basic economic model of accidents applied to the different liability Rules.

In the following the basic economic model of precaution will be applied to the different liability rules and the results analysed and compared. As an introductory remark, it will be pointed out that the terminology and notations within the different models used, will be slightly variable throughout this thesis. In the following section for instance, the lexemes of precaution and care will be used interchangeably.
7.1 No liability.

As a comparative baseline, I will start by the “no liability rule” and investigate how this absence of any liability rule will affect the incentives of injurers and victims to take due care. I stress that the social goal is assumed to be minimization of the social costs of accidents. For this to occur both injurers and victims must take care amounting to their respective efficient due care levels. The due care levels are coined $x^*$ and $y^*$, and have positive values when it is optimal for both injurers and victims to take care. The latter is the bilateral care situation. Conversely, the unilateral care situation is evident when either $x^*$ or $y^*$ equal zero, meaning that it is optimal for either the injurer or victim to take some care - not both. Both potential
agents investing in care in this situation will result in excessive and wasteful precaution.\textsuperscript{19} In a real life setting it is often the case of an alternative care scenario that either the victim or the injurer is the more efficient or lowest cost accident avoider.

Even in the scenario of no liability rule being present, the incentives of one of the actors will be affected. The victim denoted as A, will have an incentive to invest in care amounting to the due care level of \( x^* \) in the alternative care where, as has just been stressed, it is optimal for only one of the parties to take care. The victim will have an incentive to take due care up to the point where \(-p_x D = A_x\) given the value of \( y \) being zero.\textsuperscript{20} Only within the unilateral accident model of victim care, will a norm of no liability rule result in optimality. If the scenario is one of joint care instead care, where both \( x^* \) and \( y^* \) are positive values, the absence of a liability rule will be inefficient, and is not likely to result in both potential injurers and victims taking care amounting to the desired due care levels. Injurers will have no incentive to invest any amount in taking care since this will be an expense to them benefitting only potential victims. The injurers themselves will not be liable for any accidents they cause regardless of their investment in care, so they will as rational cost minimizers not take any care.

A point to mention is that in the case that the inputs of injurers and victims of care are partly substitutable, the victim may both take more or less care than \( x^* \) under no liability depending on the specific circumstances. The victim may take more care if they can significantly reduce the probability of an accident by increasing their care level beyond \( x^* \) given that the injurers takes no care. However, the victim might be forced to take less care than \( x^* \) in another scenario if measures of accident avoidance by the potential victim that were feasible when the injurer's took some care may become infeasible/unproductive when injurers take no care against accidents, and no victim-care measures may be feasible either.\textsuperscript{21}

\textbf{7.2 Strict liability.}

Now the symmetrical opposite to no liability shall be considered. Under simple strict liability, the potential victim A has no incentive to take care because he will be fully compensated for its injury. The injurer, B, on the other hand has an incentive to take care up to the point where \(-p_y D = B_y\), given \( x=0 \).\textsuperscript{22} This is because under strict liability the D. component is a cost to B in the scenario of an accident. The symmetry of strict liability to no liability is evident with regards to the alternative care case. Just as no liability is optimal when \( y^*=0 \), strict liability is efficient when \( x^*=0 \).

\textsuperscript{19} The Economic structure of Tort Law” by Landes and Posner, Harvard University Press 1987, p.60.
\textsuperscript{22} The Economic structure of Tort Law” by Landes and Posner, Harvard University Press 1987, p.63.
Importantly, there is a substantial asymmetry or difference between no liability and strict liability if we include in our analysis the litigation cost component. No liability is obviously cheaper to administer than strict liability which by assumption is costly. Strict liability is assumed to be expensive because every accident occurring gives rise to a legal claim and subsequent possible litigation. The previous statement ignores the possible defences to strict liability such as contributory negligence.\textsuperscript{23}

7.3 **Negligence..**

Moving on, the simple negligence rule will now be analysed. Under simple negligence a potential injurer will be liable for the potential victim A’s damages only if the accident was caused by the injurer operating below the court determined negligence standard of due care denoted as \( y^* \). The implicit (but not necessary) assumption is made that the court has set the negligence standard correctly and equal to the socially efficient due care level of \( y^* \). The reason why the assumption of an efficiently set negligence standard is not necessary is that existence of the Coasing mechanism. As has been demonstrated throughout the previous analysis of this thesis, the mechanism of Coasing will in theory enable agents to overcome inefficiently set negligence standards. An injurer is liable under the simple negligence rule if his care level falls below \( y^* \) i.e if \( y < y^* \). If \( y \geq y^* \), the injurer cannot be deemed negligent, and escapes liability in full. If one makes the assumption of alternative care meaning that \( x^* = 0 \), \( L \) is minimized when \( L(0,x^*) = p(0,y^*) + B(y^*) \).\textsuperscript{24} If one recognizes that \( y_0 \) can be any level of \( y \), including 0 less than \( y^* \), the injurer B will choose whether or not to break the court determined negligence depending on the solution to the following equation of: \( p(0,y_0)D + B(y_0) \), and whether or not this is a greater or smaller value than \( B(y^*) \).\textsuperscript{25} However, by definition \( y^* \) is the value that minimizes the equation of \( L(0,y^*) \), which means that \( L(0,y_0) = p(0,y_0)D + B(y) > L(0,y^*) \). Because \( B(y^*) < L(0,y^*) \), it must also be less than \( L(0,y_0) \) meaning that the simple negligence rule creates an incentive for a potential injurer to operate at the due care level of \( y^* \).\textsuperscript{26}

\textsuperscript{23} The Economic structure of Tort Law” by Landes and Posner, Harvard University Press 1987, p.63.
\textsuperscript{24} The Economic structure of Tort Law” by Landes and Posner, Harvard University Press 1987, p.63.
\textsuperscript{25} The Economic structure of Tort Law” by Landes and Posner, Harvard University Press 1987, p.63.
\textsuperscript{26} The Economic structure of Tort Law” by Landes and Posner, Harvard University Press 1987, p.64.
Figure 1.

Figure 2.

8 Property rights within a simplified framework.

In the following, the more simplistic diagram with the two agents $MEV_A$ and $MEV_B$ curves will be analysed in respect to the polluted river example. (see figure 2 on preceding page). The diagram uses different notations than the Edgeworth box example discussed previously, but similar observations are present in this diagram for conflicting interests as well.

The Pareto efficient point (socially optimal point) is denoted $e^{PE}$. In order to prove that this is the true Pareto efficient point, one can observe that in any point in the diagram different from the $e^{PE}$, Pareto Improvements could be made by the agents to a new point where at least one of them is just as well-off and the other is better off. For each Pareto improvement, where at least one agent is better off and at least one is just as well off, there is a presupposition that the agent who is made better off by the move in principle can compensate the other. The important point to be made is that for a Pareto improvement to have occurred it is not a requirement that compensation actually takes place, only that it is theoretically is feasible. The division of the mutually advantageous social gain brought about by the PI, is determined by the agents respective bargaining power. The Pareto efficient or socially optimal point is in this section is represented as the point of intersection of the curves $MEV_A$ and $MPH_B$. For the exemplified situation of the river pollution to be Pareto efficient, marginal valuation of emission for agent A must be equal to the marginal harm from emission to agent B. The Pareto efficient point is denoted $e^{PE}$. As it follows from the above definition of Pareto improvements, there exists a set of Pareto improving scenarios. The set is given by $\{e^{PE}\}$. Pareto Improvements are continuums. There exist many different Pareto improved situations towards the singular unique Pareto efficient point. In order to prove that the point denoted $e^{PE}$ is the unique (only) Pareto efficient point, one need only look at any other given point on the diagram. As an example, one may choose $e = \bar{e}$. At this point it is easily observable that $MPH_B$ is greater than $MEV_A$. This means that a move from $\bar{e}$ in the direction of $e^{PE}$ results in a net release of a quantity of the given natural resource (the river in example used) equal to the distance between the $MEV_A$ and $MPH_B$ curves. The net natural resource savings can theoretically be divided between the agents in some mutually beneficial agreement. However, as stressed before it is not a requirement of the Pareto efficiency measure that such a compensation/division of the mutual gains actually takes place between the agents, just that such is feasible.

The fist regime of analysis is the hypothetical situation of fully permitted pollution for the polluting business A. The connecting lines to the liability regime of ‘no liability’ should be

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28 Sensorveiledning JUS4121, Spring 2015, by Gunnar Norden
29 Sensorveiledning JUS4121, Spring 2015, by Gunnar Norden
30 Sensorveiledning JUS4121, Spring 2015, by Gunnar Norden
apparent. Under this system, A. – the polluting business - will choose to emit pollution up to the point where $MEV_A = 0$. This point will be denoted $\tilde{e}$, and is the point that maximizes A’s total emission value. It should be noted that this point is not Pareto efficient.\(^{31}\)

By the rationale and predictions of the Coase Theorem, the two agents are in a position to establish mutually beneficial agreements and thereby ‘Coase’ their way around this inefficient situation. As always with the Coase theorem, the assumption must be that the transaction costs are negligible. The mutually beneficial agreement will by prediction lead to a Pareto efficient level of pollution. Agent A will under the voluntary agreement reduce his pollution emission level from $\tilde{e}$ to $e^{PE}$. A will (or could) be compensated by at least the loss this move represents to him. The loss is illustrated in the figure by the area under the $MEV_A$ – curve from to $\tilde{e}$ to $e^{PE}$. B could compensate A with an amount up to the area under $MPH_B$ – curve from to $\tilde{e}$ to $e^{PE}$. A contract price on the reduction in pollution emission (compensatory amount) positioned in between these two areas will divide the surplus in a Pareto Improving way. An interesting additional point to be made in regards to the regime of fully permitted pollution for agent A. is that strategic behaviour may act as a barrier to a mutually beneficial agreement. Agent A’s marginal costs of cleaning his pollution from the river will equal zero for sufficiently high values of emission units. A can use strategic behaviour to invest in a greater emission level than $\tilde{e}$. He may do this in order to gain a greater share of the surplus from the mutually beneficial agreement or contract between A and B.\(^{32}\) This in turn may prevent the mutually beneficial agreement from occurring, if B. recognizes the strategic behaviour and this leads to hostility between the parties.

As an extension to the point of strategic behaviour, it is worth mentioning the behaviour economics theory of the endowment effect. The endowment effect, its specific consequences in regards mutually advantageous agreements, and the studies conducted in this field of behavioural economics will be discussed in depth in a separate subsequent chapter.

In short the Endowment effect theory predicts that A, as the initial endower of the right to pollute, will place an excessive value on this right. This exacerbated value of the right to pollute the river (if high enough) might eliminate the interval in between the two areas where a contract price could be positioned. In addition to the other possible prohibitions to mutually advantageous agreements mentioned above, transaction costs in general (for various reasons) might be prohibitive.

Due to the possibility that mutually beneficial agreements leading to a Pareto Efficient level of pollution might not always eventuate, the analysis will now move on to the alternative regime of imposing a fixed tax on A’s pollution units. A system where a fixed tax is imposed on units of A’s polluting emissions may be an effective and realistic way to reduce emissions to a pre-determined Pareto effective level of total pollution. The pre-determined socially optimal level of pollution on which the taxes are based upon is be graphically illustrated by the same graph as the one used above. The diagram illustrating the socially optimal Pareto efficient level of pollution on which the taxes are based upon is be graphically illustrated by the same graph as the one used above. The diagram illustrating the socially optimal Pareto efficient level of pollution on which the taxes are based upon is be graphically illustrated by the same graph as the one used above.

\(^{31}\) Sensorveiledning, JUS4121, Spring 2013, by Gunnar Norden

\(^{32}\) Sensorveiledning, JUS4121, Spring 2013, by Gunnar Norden
polluting emissions on which the tax should be based, will determine this point equal where marginal benefits equal marginal costs of pollution. This graph will be identical to the one illustrating the socially optimal accident level in society albeit with slightly different notations. There will be an assumption of an initial allocation of rights. Although the exact initial allocation does not matter, it is illustrative to assume an allocation that is not PE. This facilitates the analysis of how the rights would be allocated in a perfectly competitive market. For the purpose of this analysis the pollution emissions are defined as a given quantity in some appropriate unit measure as before. The fixed pollution tax will thus be a fixed amount per unit of pollution emission. \[ t > 0 \] The tax must be greater then nil, and will be denoted \( t \) per unit. The additional tax price on A’s units of pollution emission will result in \( MEV_A = 0 = \bar{e} \) no longer being the point at where A maximized his emission value. Due to the taxes imposition, A will maximize his emission value at point \( e^* \) instead. This is as one observes from the diagram, the point where the \( MEV_A \) curve and the \( MPH_B \) curve intersects, thus the Pareto efficient one. The conclusion to be drawn from the fixed tax regime in a scenario of two agents (businesses) with conflicting interests in one common natural resource, is that this system will by assumption lead to a Pareto efficient level of pollution if and only if the pre-determined total level of pollution at which the tax is based upon is set at the socially optimal level. As with various other regimes dependent on regulatory intervention, the condition of the regulatory body being able to observe, calculate and predetermine the true socially optimal level at which the regulation or tax shall be based on is necessary. In the present example, the requirement is that the regulatory body is able to correctly identify both the \( MEV_A \) and \( MPH_B \). From these curves intersection point, the regulatory body should be able to determine the socially optimal level of price on pollution units and set the fixed tax equivalently.

As has been stressed previously, this assumption of error free calculation of costs, valuation and harm components for agents by regulatory bodies (and the like) is unrealistic and not true to life in most cases. This section is therefore meant to be purely theoretical and not discuss the applicability to real life situations. A normative point to add is that based on the theoretical discussions in this thesis and in general within the field of law and economics, it might be of some value for regulatory bodies, lawmakers, governments, municipalities and the like to be more aware of, and take into explicit consideration the economic models proposing efficient solutions. If it is a normative goal for these bodies to achieve socially optimal allocations and levels of rights and harmful activities (where there are high transaction costs preventing agents to ‘Coase around’ the inefficient solutions) it should be an increased explicit focus on the economic models and the values and components used in their calculation. It might not eliminate the occasional erroneous calculation of relevant values by a regulatory body. However, increased focus and use of theoretical economic models and transparency in their use may contribute to a decrease in the magnitude of the errors. Furthermore, regulatory bodies should attempt to increase their focus on using standardised, mathematical calculation methods when attempting to identify the values necessary to implement in these economic models in order to arrive at as correct values as possible of social optimality.

\[ 33 \text{ Sensorveiledning JUS4121, Spring 2015, by Gunnar Norden} \]

\[ 34 \text{ A decrease in the magnitude of the errors will be assumption lead to a situation closer to Pareto efficiency.} \]
By contrast to the previously discussed fixed tax system, this regime is based on market mechanisms and no intervention by any regulatory body. This is also an advantage of the regime in question because it may be argued that regulatory body errors are more severe and serious than possible market failures.

Market mechanisms are claimed to be a more reliable and error free self-regulatory system than any system dependant on regulatory intervention. The problems of the endowment effect, strategic behaviour and transaction costs will not come into play under this regime. Under the system of tradable pollution rights, agent B. could buy the pollution unit rights of agent A. that is positioned above the point of intersection of the $MEV_A$ and $MPH_B$ curves thus above the Pareto efficient level of pollution. By buying these units of pollution at a market price in a perfectly competitive market, B. can buy his way free from the pollution units that are excessive to the Pareto efficient/socially optimal level. The regime requires the assumption of a setting with a perfectly competitive market with a sufficiently large number of actors (businesses). Because a perfectly competitive market setting requires a certain number of businesses, the denotations ‘agent A’ and ‘agent B’ are now used to represent bundles of businesses instead. The last regime to be considered is a market system of tradable pollution rights under the conditions of perfect competition of singular ones. ‘Agent A’ will represent the entire number of polluting businesses in a respective industry, and ‘Agent B’ is the denotation used for the entire number of businesses harmed by the pollution of the Agent A’s. All the businesses A’s and B’s are assumed to have overlapping interests in a common natural resource as in the previous example. Furthermore, there is assumed an initial allocation of emission rights. In the current simple example, agent A. owns all the units of pollution rights and agent B. owns none. A. places a given value on the emission of the river and B. on the other hand suffers a given amount of harm for each unit of pollution emitted into the river by A. B is willing to pay a price to be free from some of the pollution of the river. Since the market is perfectly competitive the market price for emission units will be driven to the Pareto optimal point. The market price will thus be where both agent A and agent B’s surplus is maximised which is at the intersection of the $MEV_A$ and $MPH_B$ curves. The mechanism itself is free from regulatory body intervention and purely directed by the forces of the market mechanisms. However, in order for the tradable emission rights system to achieve a Pareto efficient level of pollution emission, there has to be a regulatory determined sealing of total emission rights in the respective market. This sealing has to be set equal to the Pareto optimal total level of pollution emission. If the regulatory body errs in their calculation of the total number of tradable emission pollution units, the market mechanisms cannot save the regime from Pareto sub optimality. In respect to the determination of the sealing for the total number of tradable pollution units, the same shortcomings and instances of government/regulatory body-failure applies.
9 Introduction of the concepts of uncertainty

Up until now, the main framework for analysis has been an Edgeworth box, both in its general form and its more specialized form. The Edgeworth box is in my opinion a very illustrative and rich economic framework to conduct analysis within. However, from this chapter on, the framework of the Edgeworth box will be left behind, and replaced by extensions of the slightly shallower classical economic accident model that is so commonly found in law and economics literature.

The latter model was introduced in a previous chapter in relation to functional application to the different liability rules. It is variations over this respective analysis that will be undertaken in the following. Within this framework, different types on uncertainty will be introduced.
10 Uncertainty caused by the probability of escaping suit.

Another kind of error that might occur during the application of a liability rule and cause uncertainty and unpredictability is the chance of escaping liability. In a utopian world of tort liability law, all harm by potential injurers is internalized by the imposition of liability payments. No injurer causing actual harm would escape liability. The expected damages/liability would under such an error-free liability rule thus equal the expected harm created by the injurer. However, this perfect world where liability rules function error free does not exist under the assumption of the section. In reality, it sometimes happens that injurers who are truly responsible for a certain kind of harm nevertheless is able to escape liability and/or suit. The multitude of reasons why a truly liable injurer might escape suit and liability will not be treated in this section. The various reasons are not of particular interest for the discussion and conclusion in this part. Notwithstanding this, for illustrative reasons some examples may be mentioned. Escape from suit and liability by liable injurers might occur due to unwillingness of victims to sue liable injurers. This again might be due to high litigation costs and/or low monetary sums expected to be recoverable as damages. Another reason for escape from suit may arise from evidentiary difficulties for the court and/or the victim in terms of proving causation.

The possibility of escape from suit and liability will lower the value of expected liability component for the injurer. As has been demonstrated from the earlier analysis of the liability rules, the marginal expected liability for the injurer must equal the marginal harm created by him and imposed on the victim in order for optimal incentives to be imposed on the injurer. If the expected liability of the injurer is lower than actual harm caused, deficient incentives are likely to result. The injurer will in this scenario invest too little on precautionary measures and an excessive level of accidents above the socially optimal one is likely to result. It should be noted that even though injurers will pay the correct amount of damages equal to the harm caused in individual cases, the same will not be true of damages in total on average. On average D < H due to liable injurers sometimes escaping suit. It is these aggregate average damages that will create potential injurers to invest too little in precautionary measures and engage in the activity in question excessively.36

35 For whatever reason. There are as stated a multitude of potential reasons for this.
36 "Punitive Damage: An economic analysis" (1998) by Michell Polinsky p.889
11 Strict liability and the uncertainty caused by the probability of escaping suit.

In this section, the scenario of court errors of the type probability of escaping suit and liability will be considered and analysed under the liability rule of strict liability. As was indicated in the introduction to this chapter, the same scenario of probability of escape from suit under the negligence rule will be considered in a subsequent section. Previously in this thesis, the economic accident model has been based on the implicit simplifying assumption that injurers would be found liable for the harm they actually caused with certainty. The only limitation to the liability rule considered under the certainty assumption has been that injurers might be found liable with certainty of an erroneous magnitude of damages. It was demonstrated that errors in size of damage awards that the liable injurers would face with certainty, would cause suboptimal incentives in these agents. The same effect of suboptimal deterrence incentives is also likely to occur if the previously maintained assumption of certain liability is relaxed. For the sake of simplicity, it is assumed in this section that the level (magnitude) of the damage award is correct and equal to the harm created.

It was demonstrated in previous sections that optimal incentives of deterrence of the injurers are assumed to result if damages equal harm under strict liability. This latter assumption will not hold true anymore when the certainty assumption is omitted and it is no longer certain that the truly liable injurer will face liability and suit. The central point is that even though the injurers that are held liable by the court and sued ex post, would face damage payments equal to the harm they created, there would still be some other injurers who should be held liable but who for some reason escapes this liability and suit. The fact that several truly liable injurers escape liability makes damage awards that exactly equate harm created by those injurers who are detected and sued, deficient. Optimal incentives of potential injurers are not likely to result if there is a chance of escape from liability, and the expected damage awards still only equal the harm created. The explanation for this will follow. If there is a chance that potential injurers might escape suit, the incentive structure which was demonstrated to be optimal under the previous assumption of liability with certainty, will now be different. This may be demonstrated formally. If one lets H = Harm, and P = Probability of being found liable, it is obvious that optimal damages paid by the injurer should equal H x 1/P or Harm (H) divided by the probability of being found liable. The injurer will according to the above proposition face expected damages of P x (H/P) = H. The latter is socially optimal, and should according to the economic model induce optimal deterrence incentives. If injurers are

37 Either damage awards in excess of harm caused or damage awards in deficiency of harm caused.
38 It is perfectly plausible to construct an analysis where there is assumed to concurrently exist both an error in magnitude of the expected damage awards and a probability of escaping suit for actual harm caused by the potential injurer. Such an analysis would involve many variables, and is due to simplicity omitted. Such an analysis would be expected to yield similar results as the one conducted here, albeit with a greater magnitude of errors and thereby resulting greater sub-optimality.
39 "Punitive Damage: An economic analysis" (1998) by Michell Polinsky, p.887
not always held accountable for the harm they truly cause, they will on average not pay an adequate amount of the harm they on average cause. Injurers will in this scenario on average pay less that the harm they actually cause (D < H), and this will lead to suboptimal incentives regarding precautionary measures and activity levels.\(^{40}\) It should be noted that even though injurers will pay the correct amount of damages equal to the harm caused in individual cases, the same will not be true of damages in total on average. On average D < H, due to liable injurers sometimes escaping suit. It is these aggregate average damages that will create potential injurers to invest too little in precautionary measures and engage in the activity in question excessively.\(^{41}\)

It might be beneficial to restate the logic of the previously stated economic model of precaution. An economically rational strictly liable injurer will only invest in precautionary measures if MC of precaution \(\leq\) MB in reduction of probability of liability. Beyond this point investment in precaution will be a pure cost without yielding any benefit in terms of reducing the expected injurers probability of liability any further. If the scenario is such that the average damage award is different, due to a chance of escaping suit, the MC of precautionary measures will be than the MB of a reduction in the expected liability. An economically rational injurer will thus not have incentives to invest optimally in precaution.

In terms of the activity level, a strictly liable economically rational injurer will as has been mentioned before, take the activity level into account as a dimension of his precaution level as the activity level is an additional component which will raise the probability and magnitude of harm. Since a strictly liable injurer is liable for all harm he causes regardless of fault he will have incentives for optimal activity levels given that D = H. However, under the assumption that injurers on average pay less in damages than actual harm (D < H on average), injurers will on average also have deficient incentives to operate at the socially optimal activity level. This is because expected liability of I(x) will be less than actual harm caused on average. In other words, the value which minimized the total accident costs function of x + I(x) is now no longer x* on average. Rather due to the deficient level of damages on average, it is x°, which by assumption is less than the socially optimal x* (x° < x*). From the above discussion, one can make the following conclusive point. Problems of under-deterrence and excessive participation in the activity in question is likely to occur, if injurers under the institution of strict liability sometimes escape suit and liability and thus on average pay a deficient magnitude of damages less than actual harm caused.

\(^{40}\) "Punitive Damage: An economic analysis" (1998) by Michell Polinsky p.889

\(^{41}\) "Punitive Damage: An economic analysis" (1998) by Michell Polinsky p.889
12 The negligence rule and the uncertainty caused by the probability of escaping suit.

In the previous section, the effect of the probability of the strictly liable injurer escaping suit was analysed. In this section, the same analysis will be conducted under the institution of negligence. The analysis will be very similar and yield similar results regarding the deterrence and activity level incentives that will result. Since the analysis and results will quadrate under the two liability rules, this following analysis might appear to be somewhat repetitive. However, it is never the less included for the sake of thoroughness. The assumptions are the same as in the previous section. The framework is again unilateral accidents and $x = \text{the level of care of the negligently liable injurer measured as the cost of taking care.}$ $L(x) = \text{the expected accident losses caused by the injurer given } x - \text{the level of care.}$ The more the potential injurer invests in care the less the expected accident costs will be. Note that this is assumed to be the case at a decreasing rate. $x^*$ is again the denotation used for the socially optimal level of care that minimizes total accident costs. The assumption is held that $x^* \geq 0$. For the purposes of this chapter, $x^*$ is assumed to equal the court determined standard of care $x'$. There is assumed to no erring by the court in regard to setting the negligence standard at the socially optimal level. Both above and below this point investment by the injurer will either be too little thereby exposing him to expected liability, or excessive and thus wasteful. Negligently liable injurers are as before assumed to behave as economically rational agents, and thus try to minimize their expected accident costs. Under the negligence rule, an injurer will completely escape liability if he adheres to the court determined negligence standard $x' (x^*+x^*)$.

Due to the previously stated fact that $x^*$ is the value of $x$ which minimizes the total accident cost function of $x + L(x)$, it follows logically that due to $x^*$ being identical to the court determined standard $x'$, the economically rational injurer will be incentivized to choose $x^*$. Due to the “safe harbour effect”, an economically rational injurer will neither choose $x > x^*$ nor $x < x^*$. Choosing an $x$ greater than the court determined standard would be wasteful since the injurer is already completely free from liability by investing just $x'$ units of care. By adhering to the standard, the injurer must only bear his own care costs of $x^*$, not the expected accident costs of $L(x^*)$ which by adherence the injurer has shifted to the potential victim. Choosing an $x$ less than $x'$ would take away from the injurer the safe harbour of the negligence rule, and would make him liable for the total accident costs of $x + L(x)$ again. Since $x^*$ in any case would be the value of $x$ which minimizes the above function, an $x$ being less than $x^*$ would not minimize the negligently liable injurers accident costs. This latter proposition illustrates the characteristic discontinuity effect of the negligence liability rule.

42 “Economic analysis of accident law”(1987) by Steven Shavell. p. 33
43 “Economic analysis of accident law”(1987) by Steven Shavell. p. 33
44 “Economic analysis of accident law”(1987) by Steven Shavell. p. 34
45 The expression ‘safe harbor’ is borrowed from
Evidently $x < x^*$ will not minimize the negligently liable injurers total expected accident costs represented by the function of $x + l(x) > x^* + l(x^*)$. This alone makes an $x$ lower than the court determined socially optimal $x^*$ an inefficient and economically irrational choice by the potential injurer. In addition to the latter, injurers are able to reduce their expenses even further by raising their care level up to $x^*$. $x^*$ is by assumption a lesser cost to the potential injurer than the total of the function $x + l(x)$ and furthermore $x^* + l(x^*) > x^*$. Choosing $x^*$ is thus a safe harbour available to potential injurers which represents a harp discontinuity in their expected liability costs. For the sake of simplicity, it will be assumed for this analysis that activity levels are included as a component of the court determined negligence standard. It should be noted that this is not a realistic assumption to make, and is purely made in this section to keep the analysis basic. Maintaining this latter simplifying assumption, incentives for optimal activity levels will occur like under the strict liability rule. By the logic of the above analysis, it follows that in order for optimal incentives to occur under the negligence rule, the court determined damage award must equal the expected harm. However, damages will not equal expected harm if the truly negligently liable injurer sometimes escapes liability for which he in fact is responsible. Under this scenario, injurers in individual cases will ex post pay the optimal amount of damages equalling actual harm caused. However, for the purpose of incentive creation, one is not concerned with the individual injurer ex post. Rather the case of interest for this analysis is the aggregate average ex ante potential injurers. If individual injurers sometimes have a chance of escaping liability (a probability that liability will not be imposed on truly liable potential injurers), the average of potential aggregate injurers will face an expected deficient magnitude of damages less than the actual harm caused. If expected damages are less than the actual harm caused by injurers on average, deficient incentives are likely to result in regards to precautionary measures and activity levels. The injurers expected liability of $x + l(x)$ if they operate below the court determined socially optimal negligence standard will now be less than the actual harm they cause on average. Thus, if the court determined $x'$ is sufficiently costly to the potential injurers, they may due to the probability of escaping suit not find it economically worthwhile to invest in care amounting to $x^*$ anymore. This is likely to occur if $x'$ is costlier to the potential injurer than the potential damage award. The expected liability is now lower than under the assumption of certainty of being held liable when the potential injurer neglects the court determined standard due to the lowered probability of conviction. It might be less costly to not ‘safe harbour’ themselves by investing care units amounting to $x^*$, and instead pay the expected liability which by the assumption of this section is less than the actual harm caused on average.

From the above discussion, an identical conclusion as to the one reached for the strict liability rule with probabilistic liability will follow. If there is a sufficiently high chance that truly liable injurers have a probability of being found or held liable, suboptimal incentive of

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46 The fact that the courts might not always get their negligence standard to equal the socially optimal $x^*$ will be considered in later chapter.

The assumption will then be that the negligence standard set by courts is a continuum of norms that might be anywhere in an interval from 0 to $\infty$ i.e $x \in [0, \infty)$.
precaution and activity levels are likely to result. The higher the probability of escape from liability, the more distorted the potential injurers incentives are likely to become as a result.

47 Analysis of legal uncertainty: a stochastic negligence standard.

The motivation in this current chapter is therefore to illuminate one further complication of a potential agent attempting to predict his legal outcome ex post in an ex ante manner, namely legal uncertainty in the form of a stochastic negligence standard.

One highly important property of the negligence institution is that it should be defined as a stochastic variable rather than one single norm which will always equate the socially optimal $x^*$. The norm can fall anywhere in an interval from $0$ to $\infty$, i.e. $x \in \{0, \infty\}$ and be graphically depicted as shown below.

A stochastic negligence standard gives the equilibrium solution for a whole set of determinative negligence norms, or as many legal scholars coin them: "crystal legal rules". Each stochastic negligence norm is defined by the parameter $c$. Arguably, in many situations, such a stochastic negligence standard is a more realistic description of the legal norm is a standard. The stochastic negligence norm would in this case be a “non-determinative” norm, where the parametric description of the norm is replaced by a stochastic formulation that is given by the occurrence of an accident or adverse outcome.

Under the stochastic negligence norm, liability would be imposed on the potential injurer agent if and only if, $C \leq x$, where $C$ is a random variable with cumulative distribution function $F$. If one combines the accident technology and the legal standard, the following reduced probability distribution over the set of consequences results (a mapping from the conditioning set of legal facts $x \in X$), locally described by:

![Graph](image)

The potential injurer will as an economically rational and cost minimizing agent be incentivized to solve the following equation to minimize his expected costs:

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arg min \{x + p(x)[1 - F(x)]L\}

This looks like a simple optimization problem, but is, in fact highly complex, due to the cubulation of several types of uncertainty. As mentioned in the introductory remarks of this current chapter there exists more than one kind of uncertainty. In addition to legal uncertainty there is factual uncertainty. These kinds of uncertainties are shown by the global properties of the functions \(p(\cdot)\) and \(F(\cdot)\). If one choses to taking a first-order approach, which is the approach done in Craswell & Calfee’s (1986) book in its first analysis of this problem, the equilibrium is defined by:

\[
1 + p'(x)[1 - F(x)]L - p(x)F'(x)L = 0,
\]

with \(F'(x) = f(x)\), the legal standard density, under regularity conditions. The above equation shows that legal uncertainty affects the potential injurer agents’ incentives for precautionary measures through two terms. The first term is a negative effect, caused by a discounting of the marginal real value of precaution (\(p'(x)L\)) through the liability probability (\(1 - F(x)\)). The second term is positive effect, caused by an increase of the probability of adherence to the norm (\(F'(x)\)), valued at \(p(x)L\).

The above two aspects of legal uncertainty may be coined a ‘level and marginal effect’, respectively. However, a lack of convexity from the interplay of marginal and level effects of legal uncertainty with the accident technology, implies that it is difficult to characterize equilibriums: Potential injurers agents may under- or overcomply depending on specific aspects of the legal standard and the accident technology.

It is important to highlight that much of economic and law literature has a frequent tendency to make too strong claims regarding the direction of sub-optimal precaution direction of the potential injurer agent. It is wrongfully and frequently stated too strong claims that uncertainty \textit{always} leads to incentives of overprecaution of the potential injurer agent. An example of scholars stressing such a proposition is Cooter & Ulen in their Law & Economics, 3\textsuperscript{rd} ed, pp. 319,320 and 344. However, it has demonstrated throughout this analysis that such a string proposition should not be held. Whether or not overprecaution will be the result of the legal uncertainty is as stressed here, is dependent on the concentration of the distribution of the negligence norm. This latter standpoint is based on mainly the demonstrations of Calfee & Crasswell, (1986), who by using normal distributions and simulations were able to demonstrate that overcompliance is connected to concentrated distributions (also known as “narrow uncertainty”) and undercompliance to dispersed distributions (also known as “broad uncertainty”). Shavell (1987) also gives a general proof for a similar property (Remark 3 to Proposition 4.4).
It is not just the factual uncertainty, which offers support to the assumption that the negligence norm is stochastic. Abutment of this proposition can also be found in this norms inherent uncertainty feature. A prominent example is the very existence of appellate courts. In Norway law, the Rule of Law/Security under the law and the concept of appellate courts are so intertwined and indivisible that it is almost unheard of to think of one of the concepts without the other. Tort cases are civil cases, and under Norwegian law such cases can be retried in two instances by appeal. A civil case will start in Tingretten, and then at second instance be appealed to Lagmannsretten. In the last instance, a civil case may be appealed to Høyesterett if certain criteria are fulfilled. Both Lagmannsretten and Høyesterett are in an appeal able to try all sides and questions of a tort case. This includes the reassessment of the negligence question and whether or not this standard has been violated in the presented case. However, if there was solely one dimension of the court determined negligence standard, and it always fell on the socially optimal level, there would be no need for the appellate court to have competence to reassess this question.

By the very definition of the socially optimal level of care x*, this is the level which minimizes accident costs, and thus is the socially optimal level court would aim to set their negligence standard. If one makes the simplifying assumption that the courts have chosen the specified goal of minimization of total accident costs when setting the legal standard, the existence of appellate courts supports the supposition of the legal norm being a continuum rather than a single norm. The continuum assumption is realistic if one views an initial court decision over a negligence question as being the continuum norm falling at a point either below, at, or above the socially optimal x*. The agents can be assumed to have more accurate information about their own costs, benefits and probabilities compared to a court that might suffer from receipt of strategic, asymmetric and deficient information regarding these components. The agents will therefore under the assumption of full information detect the disparity between the socially optimal care level of x* and the court determined negligence standard in the cases where the legal standard falls above or below the socially optimal. Based on this apprehension, the agents may arguably try to appeal on the question of the negligence due to the intuitively unfair and irrational situated standard viewed from an accident cost minimizing perspective.

The proposition above could in principle be generalized to apply to all legal rules, not just the negligence standard. Legal rules when applied, and maybe also the entire court system seem to unconsciously take the element of uncertainty and error as inherent and unavoidable. The court system with its appellate court structure indicates room for error and uncertainty in the application of even apparent clear and unambiguous legal rules. The same indication can be inferred from the Norwegian court system’s mechanism of lay judges. If there were no

51 Many other countries and jurisdiction makes use of lay judges. The Norwegian court system is merely used as an illustrative example and because me as a Norwegian student has a special affiliation with the Norwegian court system.
uncertainty surrounding the application of legal rules, (even the univocal ones often referred to as ‘crystal rules’ by some scholars), the same set of facts would always produce the same legal effects. Put differently, if there was no deficiency of information regarding the facts in the case at hand i.e factual certainty, the court would always come to the same result regarding the corresponding legal effects that were to follow. If the latter were to be the case, there would be no need in terms of the concept of security under the law, to necessitate mechanisms such as appellate courts and lay judge panels.

One may argue that the reason for these above-mentioned mechanisms necessity is not uncertainty in regards to the rule of law, but rather uncertainty in regards to the facts. This argument does not seem however to carry much weight, and is not likely to coincide with reality. If the latter argument were to hold true, the competence of the appellate courts rationally both should and could be limited to the factual questions of the case. The reassessment of the application of the law should then be omitted from the appellate competence, and likewise not be questions lay judges be concerned with.

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52 The assumption of perfect court information is somewhat unrealistic in itself, but nonetheless it is illustrative for the purposes of this discussion.
Specific focus on three types of liability rules, and the connection to their economic mechanisms and purposes.

Robert D. Cooter wrote an interesting and easily comprehensible article called “Economic Theories of Legal Liability” for The Stanford Law School Symposium in 1990. The article illuminates some interesting angles of both liability law and economics, and their intermingling mechanisms and purposes. The theme in Cooter's article serve as an interesting contribution to the better understanding of the interrelation of the doctrine of law and economics, especially within the subcategory of liability rules, which is the main focus of this thesis. The interesting angle of the article focuses on the legal particularities/legal elements that act like driving forces behind the economic results of the economic analysis of law. Different legal mechanisms are used for different efficient incentive creation. Three of these legal mechanisms is of noteworthy relevance for the purpose of the topics of this thesis, and is also the ones focused on and conceptualized by Cooter.

13.1 The legal mechanism of strict liability, its economic mechanism of prices, and the economic purpose of internalization.

The legal mechanism of strict liability works by incentivizing actors to internalize costs. The legal mechanism of negligence works by creating and enforcing economically efficient standards of behaviour. Lastly, the legal mechanism of markets for rights works by channelling transactions into voluntary exchange. 53

The latter legal mechanisms are all based on several simplifying assumptions amounting to what can be characterized as ideal conditions. 54 The effects of relaxing some of these assumptions will be discussed subsequently. As mentioned above, the liability rule of strict liability corresponds to the economic mechanism of price signals, which economic purpose is internalization of externalities by the injurer of the externality he has created. The underlying assumption is that compensation computed by the is perfect. The victim should through

receipt of the damages computed by the court be restored to the state he or she had been “but for” the injury/accident. It has already been demonstrated mathematically as well as non-technically, in previous sections of this thesis, how the economic mechanism of internalization of the strict liability rule affects the potential wrongdoers’ incentive, and leads to efficiency provided that the condition of perfect compensation holds. It would therefore not be unnecessary to repeat these proofs in this section. It will however be reiterated that pure strict liability without any defence for contributory negligence only leads to efficient incentives of precaution of the potential injurer. The potential victim will under the plain strict liability rule have no incentive to invest anything in precaution, as he will be compensated fully regardless. The economically rational victim will therefore see precaution investment as wasteful expenditure and not undertake it. The important point to be made is that the economic purpose of internalization brought about by the economic mechanism of price signals, will fail when the compensation computed by the court is imperfect. Imperfect compensation is a realistic scenario in the real world. The source of unsatisfactory compensation may be many and an attempt will not be executed to mention all the possible origins of imperfections. However, some notable main sources may include strategic behaviour from the agents regarding private information about injuries and costs of precaution. As have been discussed in a previous section of this thesis, economically rational agents acting in their own self-interest may act in a strategic manner when it comes to revealing truthful private information about costs and benefits. Due to this strategic incentive of the actors, the court may compute the damages incorrectly based on this wrongful information. Furthermore, some damages are looked upon by the law as so difficult to compute that they are determined impossible to take into account in the computation of damages. Examples of such incomputable harms, may be certain kinds of psychological pain such as stress or sadness. It goes without saying that it amounts to a difficult and uncertain task to ascertain the pecuniary value of such metaphysical harms. Another possible source of imperfect compensation may be the difficulty of computing economic harms. Economic harms can take the form of unrealized profits due to for example a hold up in a production line caused by an accident for whom a defendant is liable. The complicated matter with these type of losses is that economic losses such as profit losses due to halted production, creates both external losses as well as external benefits. An illustrative example of a possible external benefits arising from a production stop is the recoup of the lost profit from a competitor businesses. It is not feasible that this recoup of lost profit can be transferred back to the injurer, which suggests that over-deterrence on the hand of the injurer will result if these lost profits/economic losses were included in the damage computation. In other words, the potential injurer would have been liable for damages in excess of perfect compensation, if one assumes that perfect compensation equals the net cost of the externality created by the

injurers’ action/activity. Based on what has been stated about economic losses above, it is apparent that economic losses often are too speculative to be computed accurately in a damage award and therefore left out. Additionally, these economic losses seem to have an over-deterrence effect on potential injurers leading to inefficient incentives. This will occur if the economic losses were to be assessed correctly, but at the same time offset elsewhere in the economy. The latter is a likely scenario with lost profit due to production hold-ups in competitive markets. In this scenario, taking into account the economic losses as a component in the damage award will represent excessive liability seen from a social efficiency perspective. The economic losses will not always here represent a true social loss in the economy since it has been recouped somewhere else in the economy. Social efficiency will therefore be unaffected or less affected by the victims’ economic loss, and it would likely induce inefficient over-precautionary incentives on potential injurers to take the economic losses into account in the damage award.

What can be deducted from what has been stressed about economic losses in general is that these might lead to imperfect compensation due to a variety of reasons stressed above. In the case of economic losses not being taken into account due to the possibility of them being recouped by competitors elsewhere in the economy, there is always a possibility of error in this determination. The recoup may be highly ambiguous to ascertain due to uncontrolled and uncertain factors. Such variables might include competitor business’ strategic behaviour, monopolistic power, unavailability/incorrect information on the hand of the customers regarding the competitor business product or service, distance between victim business and competitor business, brand loyalty etc. The above stated variables may lead to the recoup of profit elsewhere in the economy being unlikely or non-existent. If no recoup actually took place, the economic loss represented an actual net social loss in the economy. Thus, the exclusion of the economic losses in the damage award might lead to under-deterrence on the hand of the potential injurer. Based on what has been assessed and discussed about the economic losses, it can be established conclusively that they represent an uncertainty element causing a real possibility of imperfect compensation. This is so whether they are taken into

61 The recoup of the economic loss elsewhere in the economy may not always be proportionally equal, in which case the economic loss still represents a small social loss. This is stressed in “Economic analysis of accident law”, by Steven Shawell, Harvard University Press (1987) p.137.
account in the damage award or excluded. In both cases either over- or under deterrence, and thus inefficient incentives, are likely to be a consequence of their mere existence. 66

13.2 The economic purpose of the negligence standard, the economic mechanism of standards, and the economic purpose of compliance.

Very different from the rule of strict liability is the rule of the negligence standard. The negligence norm has been thoroughly analysed within the frameworks of both the unilateral and the bilateral models of precaution. These implications need therefore not be replicated. In Cooter’s article, the negligence norm is viewed as a legal mechanism that by assumption coincides with the economic mechanism of incentive creation and economic purpose of compliance. The legal mechanisms and the economic mechanisms work together in order to achieve the defined goal of efficiency. 67 Whether or not the economic purpose of compliance with the efficiently set standard of negligence will be achieved or not depends on the existence, type and magnitude of enforcement errors. As proven with the use and illustration of economic models earlier in this thesis, a perfectly determined and enforced negligence norm will always lead to perfect precautionary incentives in the agents, and thus achieve the goal of efficiency. However, in this section it will be assumed that the assumption of enforcement perfection of the negligence norm is not a realistic one to make. When one makes the assumption that enforcement errors may occur, the incentive efficiency of the negligence standard changes.

As was discussed in the preceding chapter, rational injurer may not conform to the negligence standard set by the court and invest too little in precaution if the court has a tendency of underestimating damage awards, or if the probability of being found liable is not substantial enough. 68 The type of enforcement errors leading to underestimation of damages may include omission of uncertain or difficult to ascertain aspects of harm. One emblematic example of such aspects are the economic losses due to the difficult determination of these types of harm. Economic losses were discussed previously in relation to the strict liability rule and the same that was said there is applicable in relation to the incentive effect of the negligence standard. When it comes to probability of escaping liability this is typically due to victims having difficulty proving causation, negligence and proximity of the injurer. 69 It may also include reluctance of the victims to sue due to high litigation costs. Many individual victims suffering a relatively small magnitude injuries caused by the same injurer may not feel it to be worthwhile to sue if the costs associated with litigation are higher than the expected damage award. However, in this scenario it represents an economic inefficiency that the injurers

escape suit. The collective harm the single injurer creates is likely to be substantial and not internalized by the injurer due to the distorted incentives created by unwillingness of the victims to sue. The incentive of precaution will thus be below the efficient level, and as a result too many accidents are likely to occur.

A pictorial example of unwillingness of many individual victims suffering small harms to sue a single wrongdoer is a big corporation producing a defective product that ends up injuring a large number of non-contractual third party victims.

So far only the possible enforcement errors leading to under-deterrence on the hand of the potential injurers, and thus an economically inefficiently high number of accident occurrence has been discussed. The converse scenario might be equally plausible where the distorted incentive on the hand of the injurer is in the form of over-deterrence. and thus likely to result in an economically inefficient low number of accidents. Although somewhat counterintuitive to human non-economic idealistic reasoning, as stressed in the previous, the socially optimal level of accidents is not zero. It is socially optimal to have a certain number of accidents occurring in society, because having the level at zero (or too low) would require too much investment on precaution above the optimal level. In other words, as has been restated many times throughout various sections of this thesis, any accident level above the level where marginal costs of precaution equal marginal benefits of reduction in probability of accident occurrence, cannot be cost-justified.

An example of an enforcement error leading to over-deterrence is error by the court when setting determining the negligence standard. If the court for instance is unable to correctly assess the costs, benefits and magnitudes in the marginal Learned Hand Standard, distortion in incentives will occur. The refined (marginally refined) Learned Hand Formula has its origin in the common law case United States vs. Carrol Towing Co.\textsuperscript{70} The refined Hand formula has had a great impact on the doctrine of law and economics and therefore been understandably appealed to by economists due to its formalistic structure. The formula gives the impression of a mathematical, numerical and objective definition of negligence without the need for appeal to the more subjective criteria of “reasonableness” or adherence to an inherently uncertain and discretionary reasonable man standard. The Hand formula is solely concerned with objective cost components. The definition of whether a wrongdoer has acted with negligence is simply is whether \(b > q \times d\).\textsuperscript{71} The injurer is in other words negligent if the benefit to him of the act or activity is smaller in magnitude than the magnitude of the potential harm this same activity imposes on a victim. This cost-benefit-based mathematical formula at first sight seems to avoid subjective and individualistic determination of the wrongdoer. However, what is \textit{reasonable precautionary measures} in a particular situation is variable according to individualistic and subjective features of a particular wrongdoer. More specifically, whether the injurer belongs to a group of injurers with above or below costs of precaution compared to the societal average. A strictly objective reasonableness determination

\textsuperscript{71} Where \(b\) = benefit to the injurer, \(q\) = probability of harm & \(d\) = magnitude of harm to the victim
of the negligence standard may provide inefficient incentives for the groups of injurer who are far above or far below the average in society. The groups of injurers far below average will not find it cost justified to adhere to the negligence standard since their cost of precaution may exceed the expected damage payment. This represents a social optimality problem when the expected harm is greater than the cost of precaution to the injurers, and the compensation to the victims is imperfect due to enforcement errors. In this scenario, the below average injurers will cause accidents exceeding the socially optimal level due to their inadequate incentives of precaution. This is one of the issues surrounding the negligence standard based on an objective determination of reasonableness. However, in the same way, whether the wrongdoer is above or below the average in society affects the cost components of the Hand formula. Whether an injurer is above or below average determines the cost component of precaution, as deviations from the average will make precaution either cheaper or more expensive. Furthermore, the probability of harm component depends largely on the individualistic features of the wrongdoer, as a wrongdoer with greatly above or greatly below average skills will either heighten the probability of harm given the same level of precaution, or lower it. Even the magnitude component of the potential harm may depend on the individual category of the injurer, as an injurer with a substantially above or below average skill set is likely to cause a greater or smaller magnitude of damage given the same precaution and probability of harm level.

The above suggests perhaps slightly surprisingly at first glance, that the Marginal Learned Hand Formula albeit its mathematical and economic suit, has the same inherent problem of subjectivity vs. objectivity (individual vs. average negligence determination) as for instance the reasonable man standard. A further point to make is that within the Hand formulation, an even more comprehensive individualistic and subjective assessment of the wrongdoer is likely to be required compared to the reasonable man standard. The assessment and determination of the wrongdoers costs, benefits, probability and magnitude of harm in relation to his either above or below skillset, has to be calculated for all the three components in the formula.

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72 An example of an enforcement error leading to social harm being greater than the potential damage award to the victims include: omission of economic losses in the damage award, omission of uncompensatable or impossible to ascertain type of harms etc.
13.3  The legal mechanism of property rights, and its economic implications of markets and exchange.

The legal mechanism of property rights is the third and final instrument considered within an economic framework in the article of Cooter. This particular mechanism has a profound Coase theoretic angle, and the infamous theorem shall be appropriately assessed in the following. Property rights are not perhaps amongst what first comes to mind when discussing liability law. However, it can most certainly be used in principle as one of the legal mechanisms within this field of law to achieve efficient allocation of resources. Whether or not property rights, as a legal mechanism is practical outside the realm of theory is a different question and will not be problematized or discussed in this thesis.

Property rights would theoretically work as an allocate mechanism within liability law by creation of a private market for contingent liability claims. In this theoretical market, potential victims and injurers could freely buy and sell un-matured liability claims. Whichever seller valued the contingent claim the most would obtain ownership of it. Due to voluntary exchange, there would be a surplus created between the buyer and seller, and societies net surplus would be greater than if no sale/purchase had occurred. In free voluntary markets, a sale of a contingent liability claim would only occur if the buyer passes a higher value on the claim then the original victim (seller). The difference between this highest price the buyer is willing to give for the claim, and the lowest price at which the victim is willing to sell the claim for, yields the net surplus of the exchange. The precise surplus depends on the relative bargaining powers between the buyers and sellers, however, this is not of imperative importance for the purpose of this section.

From the above stated, it follows that damages would be paid to the current owner of the contingent claim when (and if) the claim matured in terms of an accident materializing.73 An important qualification is appropriate at this point. The above proposition about the mutually beneficial sale and purchase (exchange) of contingent liability rights producing a social surplus will only hold if the assumption of negligible transaction costs is upheld. (Transaction costs, whom according to the famous Coase theorem acts as impediments and hinders voluntary mutually beneficial exchanges taking place).74 The Coasian angle on markets, exchange and transaction costs become illuminated. Ronald Coase proposed in his well-known article “The Problem of Social Costs” (1960), that the initial allocation of rights (Which for the purposes of this chapter is defined as the court's allocation ‘liability rights’) is

inconsequential regarding the goal of maximized efficiency. An example in terms of our hypothetical market for contingent liability claims could be constructed in the following way: Regardless of the court's initial allocation of a contingent liability claim, the victim and the injurer will bargain their way around this allocation if its inferior in terms of efficiency. The bargaining will be in the form of sale and purchase (exchange) of un-matured liability claims, which by assumption will end up on the hands of the buyer attaching the highest value to it. This will, as stressed before, yield a social surplus compared to a situation of no exchange and inefficiently allocated liability claims. Coase emphasizes in his article that this indifference claim hold true only if certain assumptions are held. The most important assumption that must be held true in regards to the hypothetical market of contingent liability rights is absence of non-negligible transaction costs. According to Coase (1960) (as well as later refinements of his ideas), non-negligible transaction costs will impede otherwise mutually beneficial and socially surplus yielding exchanges taking place. The normative Coase theorem stresses the importance of the law in reducing disruptive transaction costs as much as possible. If reduction of transaction costs is achieved successfully, it is indifferent how the liability law initially allocated claims (or rights), or what type of liability law was implemented. This is underpinned by the hypothesis proposed by Regan (1972) stressing that efficient outcomes in strategic games approach a hundred per cent concurrent with transaction costs approaching zero. Of course, in the real world - especially in regards to a hypothetical market of privatized contingent liability claims, transaction costs are likely to be substantial. Transaction costs in these exchange situations may be particularly large partly due to asymmetrical information between the buyers and sellers.

It will there be proposed, based on a recent yet unpublished (as of now) article from Joseph I. Daniel called “The problem of transaction costs”, that asymmetry in information and strategic self-interested behaviour of the agents, may not lead to inefficiency as would be expected based on the predictive Coase Theorem. Daniel is notably critical to the classical interpretation of the Coase theorem (which he contends does not deserve the title “theorem”), and advocates the capability of Mechanism Design to improve on the theorem. Thus, looking at transaction costs from a mechanism design angle may overcome some of the morose predictions of the Coase Theorem in terms of efficiency. The hypothetical privatized contingent liability claims with the assumed prohibitively high transaction costs arising from asymmetric information, might not lead to inefficiency according to mechanism design. However, for the sake of simplicity in terms of illustrating the economic mechanism and purpose of a privatized market for liability claims, transaction costs will be omitted from the subsequent discussion. On a more general note, one should nevertheless always keep


transaction costs and their applicability and relevance to the real world in the back of one's mind.
Economic and legal theories (I also assume theories and theorems in general) are often for their simplicity and comprehensibility's sake abridged by several special assumptions and simplifying features. It goes without saying that these simplifying features of theories in general, make them less applicable to real life cases and situations. Nevertheless, these theories are of immense descriptive and normative value. Although making special assumptions that might not always correspond to all the variables in the real world, economic and legal theories structures one's thought-process about the specific problem being analysed by the theory. As long as it is kept in mind that real world variables might need to be implemented in order to make the theory more applicable to reality, a simplified theory yields immersive insight into otherwise hard to comprehend phenomena.

As has already been explained briefly, the economic mechanism of a privatized market would for the purpose of liability law, work by firstly allowing privatization of contingent liability claims. This entails that private agents - potential victims and wrongdoers -, would be allowed to buy and sell contingent liability claims without restriction. The purchase of such a claim would give the owner the right to recover damage award when (and if) the un-matured claim matured in the future. The underlying value of the contingent claim would reflect the expected payoff from maturity, and the price matching this would be ensured by the condition of a perfectly competitive market. The above states and assesses the economic mechanisms behind a hypothetical market for liability rights. The underlying economic purpose will now be assessed. A wrongdoer creating an externality has the opportunity through a private market of contingent liability claims, to purchase the damage awards of potential victims. The market price of the un-matured liability claim would as have been stated previously, equal its underlying value due to the condition of perfect competition. Thus, when the wrongdoer would have to pay the perfectly competitive market price for the externality he is creating, the externality is internalized. The latter holds true only if the assumptions of perfectly compensatory damages and a market structure of perfect competition is maintained.  

A number of reasons regarding both market imperfections and relaxation of the special assumptions, might disrupt the chimerical result predicted in the previous. In the real world, the assumption of perfectly competitive markets rarely hold true. Asymmetry in information between the buyer wrongdoer and the seller victim regarding the underlying value of a contingent liability claim might disrupt the market price reflecting a true underlying value of the contingent claim, and prevent the ideal of market perfection from occurring. The information asymmetry might be due to the injurer having private information about the probability of injury.  

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potential victim seller. In this case, the injurer has no incentive to invest anything on precaution or reduce its activity level to the socially optimal level. This again will likely lead to a higher number of accidents that what is socially optimal. The injurer may lack efficient incentives as a result of purchased immunity from potential liability claims.\textsuperscript{80} Note that a contingent claims market would be prohibited under Norwegian Law for private agents. This follows from the provision in § 3-10 in the Norwegian Act relating to compensation in certain circumstances. This prohibition is somewhat strange, as it can not be rooted in economic considerations. In fact, it has just been shown that a market for contingent claims will produce efficient allocations for agents by transferring the claim to the agent who valuates it the most. A contingent claims market would be legal and feasible for businesses and corporations. However, is this distinction economically rational? One could lean in the direction of a negative answer to this question, as there is nothing significant distinguishing businesses from private agents in terms of economic efficiency. One could of course argue that private agents should be protected by the law as they might have weak bargaining power and therefore may not know what is best for them. However, this argument does not hold in regards to a contingent claims market with private agents as only participants. If the main consideration behind the prohibition of contingent claims markets is protection of the weak agent, this can no longer hold. What the prohibition is reality is doing, is to prevent the mechanism of Coasing to incentivize the agents within a framework of contingency claims markets. The Coasing mechanism within a contingent claims market would cause potential agents to engage in voluntary exchange which in turn would produce socially optimal allocations of contingent claims. The voluntary exchanges correct initial inefficient allocation of rights, and thus yielding a surplus in society. Is it not therefore a social loss to society that the Norwegian Act relating to compensation in certain circumstances prohibits the existence of such efficient markets?

Again, it should be reiterated that economic considerations should be more explicitly incorporated in the legal rule-making process, and each provision which has economic implications should at least have some kind of economic justification in the preparatory commentary.

14  **Hindsight bias and court application of the negligence standard.**

“The hindsight bias makes surprises vanish” – Daniel Kahneman

As an extension to the previous section regarding the proposed inherent uncertainty in regards to ex post application by the courts of the negligence rule, another specific possible source of court error will be examined.

The hindsight bias is a well-known psychological concept that has been extensively discussed in both psychological theory and behavioural economics. It will in the following be proposed that this psychological concept may provide an important insight both in descriptive and normative terms, into the ex post application of the legal rule of negligence by courts. It might be worth noting that the hindsight bias and the examination which is to follow will have universal application to all legal rules applied in an ex post manner by courts, but because this chapter has the specific focus of tort law and the negligence rule, the following discussion will be focused on this rule in particular.

The ex post application of the negligence rule involves an ex post appliance process of the standard created by lawmakers. The ex post application of the standard is applied to a scenario where the potential agents have adapted to the standard in an *ex ante* manner. The lawmakers have similarly created the negligence standard *ex ante* of possible tort cases arising in the future between potential agents having adapted to the standard *ex ante*. The lawmakers may be assumed to having calculated the costs of care by the injurers, the probability of an accident, actual damages if there is to occur an accident, in an *ex ante* manner. Expected accident losses by the potential injurer will equal the probability of an accident multiplied with the actual damages in the event of an accident \((L(x) = p(x)D(x))\). Actual damages in the occurrence of an accident is here denoted as ‘D’. In order to reach a socially optimal court determined negligence standard, the court must set the standard equal to the value of \(x\) which minimizes the victims expected accident losses i.e \(x+L(x)\) or \(x+p(x)D(x)\). The point to be made is that the lawmakers will use *ex ante* values in the calculation process of determining the socially optimal value of the standard that minimizes total accident costs. It goes without saying that this *ex ante*-process the lawmaker use is highly unlikely to be as mechanical and mathematical as these formulas depict.

A multitude of variables and components that cannot be included into the basic economic model of liability, are likely to come into play in the law-making process of setting the negligence standard. However, the goal of providing insightful predictions and theory is not obscured by this fact. It cannot be viewed as a flaw or criticism to reduce real world phenomena or process into a simplified economic model. In fact, the very purpose of an

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81 [http://www.sup.org/economiclaw/Graduate%20Notes/Chapter%202.pdf](http://www.sup.org/economiclaw/Graduate%20Notes/Chapter%202.pdf)
82 [http://www.sup.org/economiclaw/Graduate%20Notes/Chapter%202.pdf](http://www.sup.org/economiclaw/Graduate%20Notes/Chapter%202.pdf)
economic model is to oversimplify a real-world phenomenon in order to make it comprehensible and suitable for predictive analysis. This latter purpose would not be attainable without reducing complex and unpredictable real world phenomena to simplistic models.

The real-world workings in their realistic and true to life forms are too unpredictable, complex and chaotic to allow for any purposeful predictions to be yielded from them without the simplifying process of models.

While holding the assumption that the lawmakers will use ex ante values in their calculations of the court determined negligence standard (which one assumes the court aims to match the socially optimal one), a possible problem arises from the fact that the court who at a later stage employ this standard will do so in an ex post manner. It is at this stage the relevance of the hindsight bias theory comes into play. The hindsight bias has been developed from the studies of heuristics and biases in the 1970s conducted by Daniel Kahneman and Tversky. Kahneman and Tversky developed the ideas of the availability heuristic and the representativeness heuristic, and from the development of these ideas the experimental ground for the hindsight bias was created. The first experimental study of the hindsight bias was conducted by Baruch Fischhoff. In his first experiments, Fischhoff focused on the hindsight bias in terms of how people viewed the likelihood of political events in hindsight after they had in fact occurred. He hypothesized that people were going to place a much higher likelihood on the occurrence of political events in hindsight than in foresight. The experimental results yielded confirmed Fischhoff’s hypothesis of the presence of a strong hindsight bias. A large number of studies on the hindsight bias conducted later that was inspired by Fischhoff’s research have yielded similar results. In short, the essence of the hindsight bias is that judged in an ex post manner, (or “at hindsight”), the potential agents place a higher probability of occurrence on a specific scenario compared to a lower probability of occurrence in an ex ante setting where the specific scenario has yet to have taken place.

A recent article on the hindsight bias that specifically focuses on its prevalence within legal decision-making, is an article from 2007 written by Erin M. Harley, dr. in cognitive psychology. The article focuses on the US court system, but is also highly applicable to other legal systems and cross culturally. It discusses the implications of the court having to judge in an ex post manner a defendants’ ex ante choices. One of the areas the article focuses on is specifically tort law and legal liability, which is the main area of interest in this thesis. One feature within tort liability law that may make this area of the law especially susceptible to the hindsight bias is that the judges are often (if not always) presented with a scenario of negative outcome at hindsight. Usually if there is a lawsuit within liability law, there is some type of injury or negative happening for which the plaintiff is seeking damages. The article is both recent and relevant as it summarizes a lot of past research on hindsight bias in the

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courtroom as well as several studies attempting to present techniques to overcome or reduce the unfortunate effect of the bias. i.e debiasing techniques.

The article talks about jurors and the effect of hindsight bias on their decision-making after judging an event ex post. Even though jurors are not used in Norwegian civil tort-cases, the point made about jurors and their susceptibility to the hindsight bias applies equally. In order for a judge to make a fair judgement, would have to ignore the negative information regarding the outcome in the present case. The prediction of a vast body of psychological research is that the judge’s outcome knowledge biases their judgement, and thus fails to completely ignore this negative information. The judges are likely to fall victims to the hindsight bias, making them overestimate the value of the probability of the already occurred event in comparison to the value they would have placed on the probability in an ex ante scenario where the outcome was yet unknown. Fischhoff was the first to experimentally show the tendency of the hindsight bias in 1975.

Another important effect of the hindsight bias that might exacerbate its negative effects in tort cases is its ‘enhance or diminishing effect’. In addition to making judges susceptible to overestimation of the probability of materialized outcomes, the hindsight bias has been shown to cause agents to underestimate, minimize and ignore information presented to them that is inconsistent with the known outcome. On the other hand, people are likely to exaggerate information that is consistent with the known outcome. The latter effect of the hindsight bias is highly concerning regarding liability cases. The two above-mentioned effects of the bias are very likely to make judges place incorrect values on the components needed to calculate the agents’ costs of care, level of care, probability of harm and the total accident costs. In particular, the probability of harm component which is dependent on the agents’ level of care, is very likely to be exaggerated above what it might truly be, due to the judges already having knowledge of the occurrence of harm. The hindsight bias makes judges unconsciously unable to ignore this outcome-knowledge which in turn might lead to incorrect judgement of negligence. A possible consequence of the hindsight bias and overestimation of the probability of harm component given an agents’ care level, is that the negligence standard might be pushed too high. The judge might deem an agent negligent who in reality (without any hindsight bias) invested socially optimally in care given the costs of care and probability of harm. The judge might mistakenly, due to the hindsight bias, require the defendant to have invested a socially suboptimal excessive amount of care, when in reality this level of care would have been wasteful and not the care level that minimized the total accident costs. The effect described above will be equivalent to setting the negligence norm too strict, which as discussed in previous sections, will have the incentive effect of causing injurers to behave as under the strict liability rule. To recap, this means that injurers will not find it economically rational to adhere to the excessive negligence standard, and will instead invest in the level of care at which marginal costs of care equals the marginal reduction in expected accident costs.

In this section, it might be illustrative to mention the Norwegian negligence rule in regard to the detrimental effects of the legal decision makers susceptibility to the hindsight bias. Norwegian tort liability law in general, and especially the negligence rule might be considered especially discretionary and therefore unfit for use as exemplary of the structured economic
model of liability. The Norwegian negligence rule is based on an overall judgement where many components, norms, industrial regulations, and values come into play. Special circumstances in the current case at hand might also be considered in the overall discretionary decision of negligence.

Due to the highly discretionary characteristic as well as the varying components taken into account in the overall decision of negligence in the Norwegian rule, it might be difficult for decision maker a to extract the necessary values for the classic economic model of liability. Due to this above structure of the Norwegian negligence rule, the focus elsewhere in this thesis has been mainly theoretical and not constricted to any specific legal regime.

However, regarding the current discussion of the hindsight bias, the very nature of the Norwegian negligence rule makes it in my opinion especially interesting in regard to the evaluation of the bias’ impact on the many varying components and the overall discretionary nature.

The nature of the Norwegian rule arguably makes it extra sensitive to hindsight bias effects. There is a broader spectrum of components involved in the decision of negligence where the bias can come into play and thereby intensify the effect of the hindsight bias.

In a typical Norwegian negligence decision, the decision maker will seek guidance in the so-called ‘damage capability’ of the injurer’s action. The damage capability may be quantified as a comparison of the probability of harm and the magnitude of the probable harm. Both these components of the damage capability, which is often deemed the main guidance in the Norwegian negligence decision, is highly sensitive to the hindsight bias. The two components involve an estimate of probability as well as a magnitude calculation. As stressed in the previous the hindsight bias is likely to cause these to be over amplified due to the legal decision makers’ outcome knowledge.

The effect of the hindsight bias on the magnitude of harm is likely to be especially severe if the outcome of the case was a severe harmful event. A study conducted by Blendon et.al (2002) supports the finding that the severity of a negative event is positively correlated to the magnitude of the hindsight bias. Another component that might be included in the discretionary assessment is the foreseeability component.

This included the assessment of how foreseeable a harmful event was ex ante for the injurer. If the harm is deemed to have been completely unforeseeable, it is unlikely that the injurer will be deemed negligent. The hindsight bias is likely to lead to an incorrect assessment of this foreseeability.

Since the negative event has already occurred, and the decision maker is aware of this, the judgement of the injurer’s ex ante foreseeability of the negative event will likely be overestimated.

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87 "Hindsight bias in legal decision making” (2007) by Harley, Erin M. p.51
88 "Hindsight bias in legal decision making” (2007) by Harley, Erin M. p.51
89 "Hindsight bias in legal decision making” (2007) by Harley, Erin M. p.2
The article by Dr. Harely changes focus in its last section on ways in which to reduce the negative effects of the hindsight bias. This is a highly important normative question because as mentioned previously, the very foundation of the law and the legal system is built on the cornerstone of legal decision-makers ex post application of legal rules employed ex ante by potential agents. Heyley (2007) reviews various methods that has been attempted to reduce or eliminate the hindsight bias. The first potential method of debiasing is asking or requiring judges to additionally consider alternative outcomes and the adjoining reasons for these. This debiasing technique has been shown in multiple studies to reduce the magnitude of the hindsight bias. Albeit this technique does not seem to eliminate the bias completely, as participants in most studies exhibited some hindsight bias even when the debiasing technique was employed. A number of studies conducted on this method of debiasing has found supporting results for reduced bias in courtroom settings. Examples of such studies are Arkees, Faust, Gilmette and Hart (1988), Davies (1988) and Slovic and Fishhoff (1977).

An important remark to be made is that most of the studies mentioned in this section have focused on the prevalence of hindsight bias in juries. This is mainly due to the studies being conducted in the United States, where juries are used in civil tort liability cases as well as in criminal cases. In Norway by contrast, juries are not employed in civil court liability cases. Here a civil case consists purely of one or several judges without any jury involved. The results of the studies, should however be assumed to be generalizable to this type of court system as well.

One could possibly argue that since judges often are considered to have more judicial expertise than a typical jury, judges in general should exhibit less hindsight bias due to their perceived ability to remain objective. This argument does not seem to carry much weight however, and is refuted by findings in a number of studies. Judges could be classified as a type of ‘expert, at least with the judicial field, and several studies has shown that experts and judges are equally receptive to the hindsight bias as regular people. Examples of such studies are reported in the article of Harley (2007) and include Anderson, Jenning, Lowe and Reckers (1997), and Jennings, Lowe and Reckers (1998). The latter studies found prevalence of hindsight bias in judge’s evaluation of auditor decisions.

90 “Hindsight bias in legal decision making” (2007) by Harley, Erin M. p.56
91 “Hindsight bias in legal decision making” (2007) by Harley, Erin M. p.56-57
92 “Hindsight bias in legal decision making” (2007) by Harley, Erin M. p.56-57
93 “Hindsight bias in legal decision making” (2007) by Harley, Erin M. p. 55
94 “Hindsight bias in llegal decision making” (2007) by Harley, Erin M. p. 55
A second debiasing technique deployable is introducing an obligatory expert witness in tort cases who could testify and explain the traps of the hindsight bias might be another technique used to debias legal decision makers.\textsuperscript{95} Moreover, lawyers could be educated to become more aware of the hindsight bias’ detrimental effects in trials. They could thereby incorporate the cognitive psychological explanations of the bias together with possible suggested ways in which to reduce it (such as considering alternative outcomes) in their speeches and arguments for the judge.\textsuperscript{96} The results of the studies investigating this debiasing effect are not as unambiguous as the studies investigating ‘presentation of alterative scenario’ technique.\textsuperscript{97} Some of the experiments on the effects of this technique have yielded results of no reduction in hindsight bias, whereas others have found the technique successful in reducing the bias to some extent. A study conducted by Stallard and Warthington in 1998 supports the hypothesis of effectivenes. They found support in their results that the inclusion of instructions and warnings about the effects of the hindsight bias in a defence attorney’s arguments has success in reducing the bias.\textsuperscript{98}

The last debiasing technique discussed in the article by Harley (2007) is the ‘trial bifurcation method’. The bifurcation technique involves dividing a trial into different parts, where the negligence question is to be assed first where information regarding the outcome of the harm is withheld from the legal decisionmaker/decisionmakers. In the second part of the bifurcated trial, the damage award is considered, this time with outcome information. Hypothetically, with such a trial technique, when assessing the negligence question the legal decicion maker would only be allowed to hear the actions of the defendant and not the outcome of these actions in terms of the magnitude of harm.\textsuperscript{99} There has been conducted relatively few studies investigating the effect of dividing a negligence trial case in this way.\textsuperscript{100} However, studies conducted by Horowitz and Boarden (1990) and Zeisel and Callahan (1963) both show results that defendants in bifurcated trials are more likely to win compared to classic undivided ones. This might be interpreted as evidence of reduced hindsight bias due to the severity of the harm being withheld from the legal decision makers when deciding upon the question negligence Two of the few studies that have directly tested the effect of bifurcation trials on the hindsight bias are Bornstein (1998) and Smith and Greene (2005). Both the latter studies found evidence to support a reduction effect of the bias in the legal decision makers. Other studies have notably found contradicting results finding no effect on hindsight bias of this technique. Since there has been few studies conducted on this debiasing technique and the ones conducted cannot be said to be consistent in their finding, it is difficult to draw any bold conclusions of the effectiveness of bifurcated trials in general on the bias.\textsuperscript{101}

\textsuperscript{95} "Hindsight bias in legal decision making" (2007) by Harley, Erin M. p.58
\textsuperscript{96} "Hindsight bias in legal decision making" (2007) by Harley, Erin M. p.58
\textsuperscript{97} "Hindsight bias in legal decision making" (2007) by Harley, Erin M. p.58
\textsuperscript{98} "Hindsight bias in legal decision making" (2007) by Harley, Erin M. p.59
\textsuperscript{99} "Hindsight bias in legal decision making" (2007) by Harley, Erin M. p.60
\textsuperscript{100} "Hindsight bias in legal decision making" (2007) by Harley, Erin M. p.60
\textsuperscript{101} "Hindsight bias in legal decision making" (2007) by Harley, Erin M. p.60
It should be noted that the bifurcated trials do occur in Norwegian tort liability cases as well. However, their use is somewhat limited. Based on the preceding analysis and discussion regarding bifurcations possible debiasing function, it could be argued for the value of making such bifurcation in liability cases mandatory. However, it seems unlikely such a dramatic reform of civil trial system would be feasible in any near future. Reform of this sort is likely to be both administratively expensive and complicated. These two considerations are highly unlikely to be compromised without a much stronger and consistent body of empirical research showing bifurcation trials unambiguous success in reducing hindsight bias in legal decision-making. Notwithstanding this, the findings of the various experiments conducted on bifurcation trial techniques offers interesting insight on the hindsight bias in courtroom setting. Together with the other debiasing techniques discussed, it offers additional optimism on the possibility of reducing the negative and distortive effects of the hindsight bias in legal decisions.

15 The Endowment effect and its implications for market settings and the Coase Theorem.

It is a well-known phenomenon that the economically rational agents may not always behave according to the simplified assumptions held under the basic economic models. The economic
rational agents are used in the various economic models in this thesis as well as other economics and law literature, so any implications regarding these are important and of interest.

One phenomenon or theory, which might alter the assumed economically rational and maximizing behaviour of the agents in the models, is the so-called Endowment effect. The endowment effect is a widely studied and discussed phenomenon within behavioural economics. The behavioural economist professor Richard Thaler coined the phrase “Endowment effect” in 1980.\textsuperscript{102}

As will be elaborated in a subsequent chapter, behavioural economics does have a very important role to play within the field of law and economics and both should and could be incorporated into the economic models explicitly as variables. More specifically, the endowment effect and its implications for market settings and trade is of interest in this section because the majority of this thesis is based on theories, economic models and market models that all take for granted the assumption of equality between willingness to pay (hereafter WTP) and willingness to accept (hereafter WTA). Thus, all the conclusions of the economic models and theories where the variables of WTP and WTA are relevant are based on this very assumption. The behavioural economics theory in question might for the purposes of this thesis cast some healthy doubt and scepticism on the classical economic models’ predictions and conclusions. Additionally, on a normative level, the theory of the endowment effect may be helpful in suggesting ways in which to structure economic models and theories as to take into account the effect. The endowment effect theory does not refute or undermine the classical economic models and theories, but is rather a valuable variable to be incorporated into these in order to make them even more comprehensible and close to reality.

The theoretical predictions of the influential Coase Theorem are based on equality between the measures of willingness to pay and willingness to accept (WTP=WTA). However, if the endowment effect is taken seriously and taken into account, the Coase Theorems predictions might not hold in a market setting. A comprehensive article called “Experimental Tests of the Endowment Effect and the Coase Theorem” written by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler in 1990 presents and discusses several experiments investigating the presence of the endowment effect.

In their article they have covered a magnitude of controlled repeated experiments with variations in order to account for other possible explanations for a disparity between WTA and WTP and the resulting low volume of trade between participant agents. Many of the variations conducted respond to some of the common critiques levied against earlier experiments finding a prevalence of the endowment effect.

The articles collection of summarized experiments on the endowment effect all find instant valuation changes and reference point shifts which is attributed to endowing a participant agent with a given good. In the following the mentioned article of Kahneman, Knetsch and Thaler

\textsuperscript{102} Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990) p. 1328
will be discussed in some further detail. As mentioned above, classic economic theory almost always assumes equality between the variables of WTP and WTA. An example of this assumption is indifference curves being drawn without reference to current endowments of the agents and the wide acceptance of the Coase Theoretic predictions.\textsuperscript{103} The many experiments conducted in the field of behavioral economics do however suggest otherwise.\textsuperscript{104} Some critics of the endowment theory have suggested that the results of some of the previous experiments may be due to income effects. However, although income effects might account for some of the variations between WTA and WTP, it cannot account for the significant disparities between these values that have been reported in a variety of experiments. Other explanations for disparities between WTA and WTP stressed by critics include strategic behaviour and fairness notions of the agents. These latter explanations may be placed under the collective term of strategic mistakes. Importantly, disparities that can be attributed strategic mistakes (instead of the endowment effect) will disappear in experiments using “repeated games”. This is because the agents or players will learn that the strategic mistake was not a best response.\textsuperscript{105}

Before the phrase “endowment effect” had come into use, the prevalence of the effect was often viewed as a sub category of the behavioral economics phenomenon of loss aversion. Loss aversion was first shown to exist as a phenomenon with decision theory by Kahneman and Tversky in 1979. The loss aversion tendency can be viewed as the mirror effect of the endowment effect. According to the loss aversion tendency theory, a good is seen as a loss when it is lost or given up by a agent. Conversely the same good will is seen as a gain when acquired. Loss aversion refers to the effect that the tendency of the exact same good being viewed by the agent to have differing values depending on it being a loss or a gain. The economically rational agent influenced by the loss aversion tendency will place a higher value on the good if it is a loss to him in terms of a loss from the agent’s initial endowment. The agent will likewise attribute a lower value on the same good if it is a gain to his initial endowment bundle.\textsuperscript{106} The obvious immediate effect of loss aversion tendency as well as the endowment effect is that the interval at which mutually advantageous agreements between two agents are feasible, will be narrowed. If the effects are severe enough, the interval will be eliminated and any feasible voluntary mutually advantageous agreement between the agents hindered.\textsuperscript{107} The 1990 article of Kahneman, Knetsch and Thaler summarized the procedures and results of repeated market experiments investigating trading volume in induced value markets and consumption goods markets. In these repeated market experiments induced value markets using tokens where compared to consumption goods markets using pens and coffee mugs as goods. The results in these experiments showed that the median selling prices in the

\begin{itemize}
\item \textsuperscript{103} Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990), p. 1326
\item \textsuperscript{104} “Toward a positive theory of consumer choice”, by Richard Thaler, p. 39-60
\item \textsuperscript{105} Coursey,Hovis and Schulze (1987), Brookshire and Coursey (1987)
\item \textsuperscript{106} Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990), p.1326 -1328.
\item \textsuperscript{107} Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990), p. 1328
\end{itemize}
consumption goods markets were more than double the median buying prices. In other words, there was found a great disparity between WTA and WTP for the participant agents. The participant agents acting as buyers and sellers in the experiments displayed a wide range of values in their valuation of the consumption goods. This is indicative of conditions of (close to) perfect market efficiency if only the endowment effect had not been present. There were several subsequent experiments with variations conducted in the repeated market setting. However these consecutive repeated market experiments yielded similar results supporting the hypothesis of a strong prevalence of endowment effect in the participant agent being endowed with the good in question in the experiment setting. The income effect was assumed and concluded to have had minimal effect on the results in all the experiments. There were identical incentives in the induced value markets and consumption markets in all the repeated market experiments. The first half of the experiments involved small monetary incentives, and the second half involved no monetary incentives whatsoever.

In the markets for consumption goods where all participant agents faced monetary incentives, they also gained experience in trading and market rules because the same participants had previously been part of the induced value markets group. Even though the trading procedures were identical in both types of markets groups (induced value markets and consumption goods markets), the WTA prices were more than double the WTP prices in the consumption goods market. The results also showed a comparatively high volume of trade in the induced value markets. This arguably rules out transaction costs as being a contributing factor for the low volume of trade found in the consumption goods market. There was no under trading present in the induced value market. In this market market/trade experience and/or prohibitive transaction costs could not have been contributing factors. Even though market-trading experience was gained in the course of the successive consumption goods markets, the discrepancy between WTA and WTP remained stable over the repetition of these markets. This shows that that market experience (as well as other ‘strategic mistakes’) is unlikely to have played any contributing factor to the results. In order to assure that the results found are not attributable to agent’s strategic behaviour a variation of the repeated markets experiment was conducted in order to account for this possibility. The strategic behaviour the researchers were trying to make sure were not contributing to the results were misrepresentation of true values by the agents in order to attempt to influence the price to their own advantage. The method used in this variation was random selection of price. The results were close to identical to the previous phases of the repeated market experiments.

The endowment effect in agents results from difference between relative preferences for a given good and money value. One will expect a high reluctance to sell compared to willingness to buy.\textsuperscript{108} This again will likely result in under trading of the good in question. In the repeated market experiments there was as mentioned above found a high prevalence of under trading. In accordance with these predictions of the endowment effect, results from the experiments

showed a small reluctance to buy and high reluctance to sell the given consumption good.\textsuperscript{109} It was also found that the participant agents placed significantly higher values on the given consumption good if they were part of the group who had been ‘endowed’ with it. The endowed participants were compared to two other groups. The first other group was the potential buyers who had not been endowed but instead given a sum of money in order to engage in trade. This group did not show any reluctance to buy, again in accordance with the predictions of an endowment effect. The second group was group of participants that were neither sellers nor buyers, but ‘choosers’ who could choose between the consumption good and a sum of money. This group acted as a control and should according to the theory being tested not display any of the signs of the endowment effect as they were not endowed with anything, nor in a position to trade as buyers.

15.1 A bilateral bargaining experiment testing the predictions of The Coase Theorem.

The Coase Theorem predicts, as has been stressed previously, that regardless of the initial allocation of recourses or goods between agents, they will through voluntary bargaining reallocate the resources between them in a Pareto efficient manner. In other words, according to the Coasian predictions an inefficient initial endowment or allocation of resources/goods/rights between agents will self-correct through mutually advantageous trading

agreements as long as transaction costs are low and rights are well defined.\(^{110}\) Another condition required by the Coase Theorem, which is not explicitly formulated in the theorem itself, is that the marginal rate of substitution between the two goods in the respective allocation must be equal in order for the mutually beneficial agreement between the agents to be feasible. One explanation for a disparity in the values of MWA and MWP is that it is the endowment effect that affects the marginal rate of substitution of the agents. The endowment effect causes a disparity in MWA and MWP, thus prohibiting otherwise mutually beneficial and socially desirable Pareto efficient trades to take place.\(^{111}\) If one were to ignore the endowment effect when considering the Coase theorem, its predictions as they are expressed in the traditional theorem might no longer hold.

In the 1990 article by Khanerman et. al, the researchers used a bilateral bargaining experiment to test this hypothesis that a possible endowment effect would have implications for the Coase Theorem. The procedure in this variation of the experiment consisted of a starting session with a simple game being played in participant agent pairs. The winner of the game was endowed with a chocolate bar whereas the losing part was given a ticket with a value of 3$ that could be redeemed for this very sum. The instructions to the participant agents by the researchers were that the losing part was allowed to sell the 3$ ticket if the pair were able to reach a mutually beneficial agreement. Mimicking the predictions of the Coase Theorem, the researchers further instructed the participants that there was a 2$ surplus between them as a pair if a mutually beneficial agreement was made. The results from this bilateral trade experiment showed a high reluctance to trade the chocolate bars. It was ensured in the experiment that the averages in valuation of the chocolate bar varied enough for mutually beneficial agreements to be feasible.\(^{112}\) The conclusion that can be inferred from this bilateral trade experiment is that the predictions of the Coase theorem might have to be reassessed in order to take into account the prevalence of the behavioral economics phenomenon of the endowment effect.

The endowment effect would make an agent who had been ‘endowed’ with a property right place a higher value on this right and this have a higher valuation on his WTA than his converse WTP for this exact same right had he not been endowed in the first place.\(^{113}\) This disparity thereby hinders otherwise mutually beneficial trades from taking place, and an efficiency loss to society would result. The researchers conclude from the collective results of the various experiments on the endowment effect, that it is likely to be found and be present in real life market settings.\(^{114}\) If one is to take this rather convincing body of research and experimental

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results on the endowment effect seriously, one should observe that it has great consequences/implications on traditional law and economics theory.\textsuperscript{115} The implications are particularly visible in terms of the Coase theorem. The initial allocation of property rights is no longer as insignificant in terms of final allocations if one takes into account the endowment effect on the initially endowed agent.

One may link these implications back to the previous chapter on externalities where an Edgeworth box was used. The classical economic assumption of the Edgeworth box is that the indifference curves of the agents are completely independent of the initial endowments of the agents. The endowment effect however challenges this traditional assumption by stressing that the agents’ initial allocations and endowments in fact is significant for their preferences.\textsuperscript{116} It was suggested by Tversky and Kahneman that the endowment effect and its implications might be incorporated into the Edgeworth box by drawing a “kink” in the indifference curves at the endowment point.\textsuperscript{117} The endowment effect might dampen trade in the economy due to trade being less profitable when agents are affected by the effect. The loss aversion tendency may exacerbate this effect even further.\textsuperscript{118} It can be observed from the experimental results summarized in the article by Kahneman et al. (1990) that the endowment effect is likely to be most problematic for seller’s marginal willingness to accept.\textsuperscript{119} Furthermore, the endowment effect is likely to be most prevalent in sellers holding a good with few substitute goods.\textsuperscript{120} The endowment effect might have specific practical interest in terms of Norwegian Law within the field of government expropriation of property and the legislation and principles surrounding this. Compensation for compulsory acquisition is according to Norwegian law based on the compensatory principles of direct economic loss and market price of property. In other words, Norwegian expropriation laws compensation principles do not traditionally take into account the disparity between an endowed agent in the position as an expropriationee’s MWA and MWP. The normative question is whether this feature of the compulsory acquisition system has any fairness or efficiency implications and if so which.

The legal limits for expropriation is found in The Constitution of the Kingdom of Norway §105 which states that “If the welfare of the State requires that any person shall surrender his movable or immovable property for the public use, he shall receive full compensation from the Treasury.” Expropriation requires positive law authorization, and such can be found in various

\textsuperscript{115} Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990), p. 1343
\textsuperscript{117} Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990) p.1344
\textsuperscript{118}Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990) p.1344
\textsuperscript{120} Experimental Tests of the Endowment Effect and the Coase Theorem”, by Daniel Kahneman, Jack L. Knetsch and Richard H. Thaler (1990) p.1345
Acts on legitimate expropriation purposes in Norwegian law. Two examples of such act are the Plan and Building Act and the Expropriation Act. Moreover, it follows from the Constitution Act, that the reasons for the expropriation have to be for the public purpose. The normality is that a public body is the buyer of the property or land in question to be expropriated. However, in some circumstances private parties could be authorized to expropriate as well. In theory, the expropriation process can be viewed as a pseudo-market negotiation situation, in that it mimics the process of market negotiation between economically rational agents. The expropriation process achieves the market price equilibrium that would have resulted in a free market situation if there were no market failures present.

Market failures that would disrupt voluntary agreements taking place between agents include monopoly behaviour, strategic behaviour and/or high transaction costs. These types of failures are likely to occur in real life expropriation processes because the very nature of the situation of expropriation. In an expropriation situation, the government or other public body needs the property/land in question for some public important purpose. The seller who is the endowed owner of the property/land in question is likely to have full information of this. Under the assumption of him being an economically rational profit-maximizing agent, the pseudo-seller agent will realize the monopoly position he is likely to be in and realize that it is room to push his selling price unreasonably high. In addition to this, the pseudo-seller agent is likely to be affected by one or more of the behavioural economical tendencies. Loss aversion will cause him to over-value the value the property in question, and/or the endowment effect causing a large disparity in the MWA and MWP.

For above mentioned reasons (and more), actual voluntary market transaction between the agents are likely to be difficult and in any case entail substantial transaction costs. This may justify the necessity of the forced nature of expropriation. This may even why the Norwegian law does not offer better protection than “option protection” for expropriation purposes. Property right protection is obviously a better form of protection for the agent being expropriated than liability protection since it gives the initial owner the entire bargaining advantage. The term pseudo market transaction is used because compulsory acquisition of property only mimics the free market system. Expropriation is in fact no real free market transaction since there is no element of voluntary sale on the hand of the seller as in traditional market transactions. The pseudo-seller is obliged to give up his property if the legal basis for expropriation is fulfilled, and is only entitled to compensation for economical loss and market value of the property ex post. In this way, the expropriation transaction process is very similar to the mechanism of liability law. Liability law is like expropriation based on the principle of compensation ex post with no option for protection or injunction ex ante to stop the property right from being violated in the first place.

Norwegian expropriation law is based upon the overarching precept of full and fair compensation. 121 What exactly lies in this principle however is not unambiguous and especially

from the pseudo-seller’s point of view debatable. One principle that comes under the main precept of full and fair compensation is the principle of direct effect. This entails the direct effect of the property/land-loss and the expropriation act, and thus bars recovery for derivative losses. Another, principle for expropriation compensation is the principle of economical loss. Economical loss compensation refers to the recovery of a pecuniary normalized market value of the property/land. It is this principle that would bar any value component of the property/land in question that is unrecognized by a general market.122 Examples of such valuation components are the ones attributable to the discussed behavioural economical tendencies of agents. It should be noted that exceptions exist and since the court has discretionary competence, they can diverge from these principles in special or extreme circumstances. However such occasions are rare within Norwegian jurisprudence. 123

There exist no standardised method for calculation of valuation of the property, so this is up to the courts discretion.124 In theory that means that if the behavioural economic theories were taken into account (such as the endowment effect causing a disparity in the agent’s MWA and MWP), a court could adopt principles of heightening the compensatory amount for the expropriatee in order to match his personal valuation of the expropriated property or land. This could dampen perceived injustice of the compulsory acquisition that is often felt by the pseudo-seller expropriation victims. During debated and public opinion it has often been transparent that principle of economical loss is sometimes felt as unjust and unfair by the landowners. Any measure or reform to reduce this perceived unfairness would be beneficial in terms of the public opinions perception of fairness on the expropriation field.125 However, it should be noted that compared to other European countries, Norwegian levels of compensation are generally quite high already.126 The very existence of a perception of unfairness in compensation by the pseudo-sellers may not be justifiable to heighten the compensation level above actual market value of the property/land and economical loss. The endowment effect and loss aversion tendencies in pseudo sellers are as have been stressed in the previous, merely impressions felt by the agents, and not true pecuniary values of the good or property in question. The agents are not willing to pay the equivalent sum as the one they require for giving up the identical property in question, had they not been in possession of it in the first place. They have a higher pecuniary value on their willingness to accept than their willingness to pay for the identical property in question in the scenario of not being in possession of the property in the fist place. The disparity represents a misperception of valuation of the agents that are attributable to behavioural economical shortcomings of otherwise economically rational and profit maximizing agents. The question

whether such behavioural shortcomings of agents should be taken into account in a government or regulatory body’s fairness objective is to put it subtly a bone of contention.
basic accident model broken down in a Game theoretic demeanour/ an institutional accident model.

The basic economic accident model and its implications under the various liability rules have been the main focus and nexus between the various sub-topics throughout the main part of this thesis. It is possible to represent the classical model in an even more institutional and game theoretic demeanour than has been done in the previous chapters and sections up until now. Representing the economic accident model in this manner makes the intermediary between the legal rules, incentive structure of agents, and the underlying game theory even more explicit and transparent than in the classical representation. This is a clarifying feature of the accident model and therefore in my opinion value added to the field of law and economics. Anything that adds to the understanding of liability law’s underlying working mechanisms is of particular interest in this thesis, and the institutional angel of the economic accident model will thus be discussed and thematised in the following.

The basic accident model under the different liability rules may be represented by a specific technological relationship that can be depicted with the following figure.\(^{127}\)

The technological relationship depicted above represents a game theoretical framework where there are two agents functioning as players of the game. The two players in this game theoretic context are the potential injurer and the potential victim. Important to note is that the game theoretic relationship of the two players or agents is only significant in a bilateral accident model where both players’ precautionary levels are relevant. In a unilateral accident model, only one players’ actions are relevant, namely the potential injurer and his investment in care. Under the bilateral accident model however, both agents’ investment in precautionary measures affect the risk and magnitude of harm. The potential injurer agent is here to be denoted as A, and the potential victim agent as B. The two players respective precautionary investments are denoted x for the injurer agent and y for the victim.

127 Figure collected from: “Game Theory & Tort Law”, by Gunnar Norden, PhD Course, Copenhagen Business School, Nov. 17-18, 2016
The two players have certain strategy sets that consist of their individual choice of the level of precaution. This choice of which level to operate at is a decision problem which solution is determined by their incentive structure under the different liability rules. Any given legal liability rule can be viewed as nexus between legal facts and legal consequences. The rule is a norm that binds together a set of ex post legal facts with the perceived correct set of legal consequences that are ex ante determined. In this sense, a legal rule possesses the functionality of a norm that intentionally acts determinative of legal consequences. For simplicity, the unilateral accident model shall be considered in depth firstly before the subsequent analysis of the bilateral model. Under the unilateral accident model the legal facts are the level of care chosen by the potential injurer. This can be represented in the following manner: $LF = x = [0, \infty)$. The legal consequences will be whatever liability is prescribed by the given liability rule and may be denoted as $LC=R=[0,\infty)$. The level of care possesses the property of being continuum as is shown by the mathematical representation of it above. For a general diagrammatic representation of a continuum norm, I refer back to the stochastic variable figure illustrating the continuous property of the court determined negligence rule.

The various legal rules norms represent different institutions, and it is under these that the economic incentive structures of the agents come into play. The incentive structures of economically rational agents, and the working mechanisms behind these are assumed to have been processed in enough detail in a previous chapter, and will therefore not be reiterated in full in this section. The different legal liability rules can be viewed as different institutions with different incentive structures and decision problems attached to them. For the purposes of the unilateral care model, the decision problems faced by the potential injurers will be what level of care to invest in. Within each institution in this model, the potential injurer or agent can solve the institutional decision problem by choosing their optimal strategy. The optimal strategy for an economically rational self–interested agent is the cost minimizing one, and which one this is varies according to which institution he is under.

Under the institutional norm of ‘no liability’, the incentive structure of a potential injurer in a unilateral accident model will be to pay zero damages regardless of his choice of level of care. In other words, the potential injurer will not pay any amount of compensation for any $x \in [0, \infty)$. The cost minimizing and optimal strategy for the economically rational and self-interested agent will under this liability rule be to invest zero in care because this is value of care that minimizes the agents private expected accident costs. $x^* + p(x^*) \cdot L$ is the equation that minimized societies total expected costs, and this is also the Pareto efficient equation. The value of $x$ that minimizes the equation $x + p(x)L$ in private terms for a potential injurer under a ‘no liability’–scenario is $x = 0$. Thus, investment of 0 units in care.

Under the institution of strict liability, the incentive structure of a potential injurer in the event of an accident will be to pay the full accident costs in damages to the potential victim for the accident he has caused. The potential injurer is fully liable regardless of his investment in care. The potential injurer will pay damages of $L$ for all the continuum of care levels $x \in [0, \infty)$. As stressed previously, the probability component ($p$) in the equation for total expected costs is dependent on the potential injurers investment in care components ($x$). One of the main
assumptions under the classic economic model of unilateral accidents is indeed that the probability component \( p \) in the equation for the total costs of an accident causing harm to a potential victim is both a declining and convex function of the care component \( x \). It follows logically from the previous that the economically rational self-interested potential injurer choosing his optimal cost minimizing strategy will set his care level equal to the socially optimal and Pareto efficient level of \( x^* \). This is because \( x^* \) by its very definition is the value of \( x \) that minimized the expected total cost equation of \( x + p(x)L \). Since the potential injurer agent will be strictly liable no matter what for the expected accident costs if an accident where to occur, he will in his self-interest want these costs to be as low as possible. The agent will achieve this by choosing the optimal private cost minimizing strategy of choosing the socially optimal level of care.

Under the institution of the negligence norm, the incentive structure of a potential injurer is influenced by the significant discontinuity jump in accident costs of the norm. If an accident where to occur, the potential only pays damages if his investment in care components falls below the ex ante court determined negligence norm of \( c! \). In this scenario he must pay damages equal to the expected accident costs of \( L \). If, on the other hand the potential injurer has invested in a care level equal to or above the court determined one, he faces no liability and pays zero in damages to the potential victim. In other words the potential injurer will pay damages of \( L \) for all the continuum of care levels below \( c! \) and zero for all continuums of care levels equal to or above \( c! \).

For the purposes of this chapter, It is assumed that the court determined negligence standard is set exactly equal to the socially optimal one of \( x^* \). Only under such an assumption will the private optimal cost minimizing strategy of the potential injurer of adhering to the norm of \( c! \) be synonymous to the socially optimal Pareto efficient level. It has been discussed in a previous chapter why the potential injurer will not choose a care level higher than the court determined one. To reiterate, this is due to the safe harbour-effect of just adhering to the court determined level. Any investment of care components above the safe harbour of the court determined negligence rule, will be wasteful expenditure to the potential injurer without incurring him any benefits. Wasteful expenditure cannot be part of an agents’ optimal cost minimizing strategy.

Because the above proposition about the institution of the negligence norm and the optimal strategy of the potential injurer under it, only hold true if \( c! \) is equivalent to \( x^* \), it is worthwhile discussing the implications if this assumption is abandoned. There is no reason to assume that the court is capable of exactly calculating their negligence norm in this way, and thus errors regarding the accuracy of this norm may have implications in terms of both incentive structure and optimal strategy of the potential injurers agents. In this section, it is of significance to reiterate the negligence rules’ stochastic property of the negligence rule. For an illustration, I refer to the figure in the relevant chapter. The negligence rule is as stressed previously a continuum of norms that may be mathematically represented as \( c! \in [0,\infty) \). The court determined negligence rule could in theory fall down at any point in the continuum interval of

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\(^{128}\) Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p.143
the norm, and since there is only one singular point of social optimality (the $x^*$ point), it is likely that the court frequently errs in setting their negligence norm above or beyond this optimal point.

The severity and type of implications such court errors may have depends on the magnitude and direction of the respective court error. If the negligence standard is pushed too far (meaning setting it too strict by requiring too costly precaution measures), the cost-minimizing strategy for the agent will be to disobey the court determined negligence standard of $c_1$, and instead act as if under the strict liability rule. How far and strict must the court determined negligence rule have to be pushed in order for the potential injurer to self-correct and switch to strict liability incentive structure? The answer is dependent on the disparity between the cost of care under the $c_1$, and the total value the equation of $x^* + p(x^*)L$. If the pecuniary value of the latter equation is the lowest, the court determined negligence standard has been pushed too far/strict by the court with the likely consequence being that the economically rational and self-interested potential injurer switching to a strict liability incentive structure.

It should be pointed out that the agent will switch to the cost minimizing strategy of the strict liability incentive structure when adhering to the court determined norm is no longer the optimal strategy. This self-correction coincides with the social cost minimizing strategy. In this way, the private optimal strategy acts as a self-corrector for both the potential injurer agent himself and the social Pareto efficiency. The up until now considered unilateral accident model will in the following undergo an advancement by adding one further component to the total cost accident equation. Just as in the previous chapters, the first advancement to be made is the relaxation of the simplifying assumption of the single care component. The most basic and simplified version of the classical accident model assumes that care is the only determinant of accident risk and cost in the total cost equation. This assumption is not always realistic in many areas of tort liability law, and it is therefore beneficial to relax such an assessment in terms of a full assessment of the classical economic accident model and its implications. Such a full assessment is necessary because the very purpose of this current section is the attempt of more explicit illumination of the game theoretic and institutional angles of the classical economic accident model. For the latter stated reason, it is of high importance to go through the multiple versions of relaxed assumptions for the classical accident model and connect each of these to their underlying game theoretic and institutional features.

The assumption of this version of the unilateral accident model is now that the potential injurer has one further component to invest in and derive utility from. In addition to investing in care components, the potential injurer may now choose his respective level and frequency of the activity in question. One may coin this version of the classical accident model as the “unilateral care plus activity level-model”

The potential injurer will as before choose his level of care $x$. In addition to this he will also choose his level of activity which will be denoted $a$. The $a$ component is a continuum variable representing the number of times the potential injurer engages in the respective activity. $u(a)$ is the function for the utility the potential injurer derives from engagement in the activity in

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129Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p.146
question. The function representing the agents’ utility from engagement in the activity $U(a)$ is (as in classical economic theory) assumed to be an increasing and concave function of the activity level variable.\(^{130}\) Thus, the economical law of diminishing returns applies to this function, as the potential injurers utility is assumed to increase with the activity increasing. However, this increase in utility takes place at a diminishing rate, meaning that at some point along the increase in the “utility derived from respective activity-curve”, the utility component of the agent will fall instead of increase. $x + p(x)L$ is the costs to the potential injurer agent of his investment in care components plus the expected accident costs generated every time the respective activity is undertaken.\(^{131}\) Since the activity level variable $a$. is assumed to represent the number of times the potential injurer chooses to engage in the activity in question, it follows by logic that $a(x + p(x)L)$ is the equation representative of the total expected costs dependant on the activity variable. Under this version of the unilateral accident model the social objective is no longer to minimize total expected costs as was the assumption under the singe care-component determinant version. Here the social objective to maximize the value of $b(a) – a(x + p(x) L)$. The value of the latter equation represents the total value of the potential injures derived utility from a given activity minus the total costs to society of this same activity. It is important to note that the Pareto efficient value of the two functions making up the equation in question goes in opposite directions. The optimal value of the activity level in the function of $b(a)$ is $a^*$, which is a maximizing value. Conversely, the optimal value of the care level is $x^*$ for the equation of $x+p(x)L$, which is a minimizing value. The unique Pareto optimal value of the activity level component ($a^*$) is determined by the intersection of the curve representing marginal benefit to the potential injurer and the curve for marginal total expected costs to society given a Pareto efficient care level.\(^{132}\)

The potential injurer agent acts under various incentive structures depending which intuitional legal norm is valid. Also under this version of the unilateral accident model the incentive structure under the various intuitions reveal the agents optimal cost minimizing and utility maximizing strategy. This private optimal strategy may or may not align with societies given objective of minimization of total expected accident costs, or as under this version of the accident model – maximization of the total value of utility to the potential injurer agent minus total expected costs for society given the respective level of activity chosen. If the institutional norm is assumed to be of “no liability”, the optimal private strategy for the potential injurer agent will be a Pareto inefficient combination of overinvestment in activity and underinvestment in care. The agent will rationally engage in the given activity excessively to maximize his own utility. It is here important to point out that the potential injurer will not want to increase his activity level infinitely (not above the point where marginal utility of the activity level decreases into negative utility) due to the law of diminishing returns for the activity level component. The potential injurer will simultaneously underinvest in components of care and over-engage in the activity in question. He will be incentivised to behave in this

\(^{130}\) Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p. 146

\(^{131}\) Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p. 146

\(^{132}\) Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p. 146
manner due to him being an economically rational agent whose assumed delimited goal is to minimize his private total expected costs.

Under the no liability-institution, the private expected costs to the potential injurer does not coincide with societies total expected costs since the agent is excused from any liability. The cost minimizing and utility maximizing strategy of the potential injurer agent is to choose a zero value for the care variable \( x < x^* \), and an activity level of \( a > a^* \). This incentive structure is economically rational given the assumption of an economically rational self-interested agent, since he faces no pecuniary consequences or liability for failing to choose the socially optimal values of the two components \( a \) and \( x \). The result of these implications is thus likely to be a concurrently both excessive and deficient levels of activity and care, thus a Pareto inefficient equilibrium. Under the institution strict liability, the incentive structure of the potential injurer will be exactly opposite of what has been proposed in the latter about the norm of ‘no liability’. Under this liability institution, the agents private goal of cost minimization and utility maximization will coincide with the assumed social goal of maximizing the value of the equation for activity utility minus total social total costs \( U(a) - a(x + p(x)L) \). Due to this alignment of the private and social objectives, the potential injurers will be incentivized to invest the optimal amount of care units \( x^* \), as well as engage in the activity at the socially optimal and Pareto efficient level of \( a^* \). The alignment of delimited goals, results in the potential injurer facing an equal amount in liability payments as the value of total accident costs (represented by the \( L \) in the equation). It follows by logic that the optimal cost minimizing and utility maximizing strategy of the agent is to choose values of both \( a \) and \( x \) that maximize \( U(a) - a(x + p(x)L) \). Since the totality of this equation represents total value of the potential injures derived utility from a given activity minus the total costs to society of this same activity. As stressed in the previous, \( x^* \) is by definition the value of \( x \) that minimizes the value of the equation \( x + p(x)L \). Having established this first, one can derive the optimal value for the activity level component.

The optimal value of \( a \) is determined by the intersection of the marginal social cost value curve (which assumes the socially optimal level of care \( x^* \)), and the marginal utility from the activity curve \( U'(a) \).

The Negligence rule differs from the two institutions described above. The incentive structure under this norm results in optimality in one, rather than of both or neither of the components determinative of risk. The potential injurer will under this institution be incentivized to invest optimally in the care level component i.e setting it equal to \( x^* \). \( x^* \) is again, for the purposes of the current analysis, assumed to identical to the court determined negligence standard which may be denoted \( c^! \). The explanation for the agent’s incentive structure for care under the negligence rule is identical to the one presented under the unilateral accident model with the care component as the sole determinant of risk. It would therefore be superfluous to reiterate this for the purposes of the current section, and the reader is instead referred to the mentioned previous section for a complete explanation of the agent’s incentive structure under the negligence norm. The reason why a Pareto efficient equilibrium will not result under the negligence institution in the unilateral accident model with care and activity levels as determinants of risk is due to the incentives for Pareto sub-optimality of the activity level.
component. The optimal cost-minimizing and utility-maximizing strategy for the potential injurer agent is to engage excessively in the activity in question and thus choose an \( a > a^* \). The agent is likely to be incentivized to increase his activity level up to the point where the utility of the activity starts to diminish. The reason is as before the ‘safe harbour effect’ of the negligence norm. The agent is free from all liability if he makes sure to adhere to the court determined norm. Being free from all expected liability, there is nothing incentivizing the agent to restrict his activity level to the socially optimal one. Engaging in the activity at the socially optimal level represents a utility loss for the agent without incurring him any benefits as he by choosing his value of \( x \) to be \( x^* \) is already in the safe harbour of ‘no liability’. The situation may be illustrated graphically:

Societies objective is as before assumed to be maximization of the value of the equation \( U(a) - a(x + p(x)L) \). This does not however coincide with the objective of a potential injurer under the norm. Because the potential injurer is already freed from all liability by choosing his value of \( x \) to equal \( x^* \), his private objective will solely be to maximize the value of \( U(a) - ax^* \). Under the institution of the negligence rule there is thus a disparity in the private and social cost of engaging in the respective activity, which again leads to a disparity of private and social objectives. The costs of engaging in the activity in question are not fully internalized under the negligence norm. For the potential injurer, the cost of engagement is solely the value of optimal care \( x^* \) equating to the court determined norm. This is a lesser value than the true social cost consisting of \( a(x^* + p(x^*)L) \).

From the above analysis, it can be concluded that optimal private cost minimizing and utility maximizing strategy for the potential injurer agent includes excessive engagement in activity under the institutions of both no liability and negligence. How severe these implications are for the Pareto optimal equilibrium depends on the magnitude of the expected harm equation \( p(x)L \) from the respective activity.\(^{133}\) Having completed the analysis of the unilateral accident model above with and without advancements, it is time to consider the bilateral accident model in the same manner. Within this accident model both the potential injurer agent’s and the potential victim agents’ level of care affects the probability component of the total accident cost equation. Under the bilateral model with care as the sole determinant of risk both the two agents’ investments in precautionary measures that are relevant. As before the potential injurers investment in care is denoted \( x \) and the potential victim’s denoted \( y \). There will be two optimal cost minimizing strategies to consider under this model which are dependent on each other. The combination of the two cost-minimizing optimal strategies of both players will result in a Nash equilibrium where none of the agents has any incentive to deviate from their strategies as long as the other player remains constant in his choice and full information is assumed for both.

The first version of the bilateral accident to be considered shall be the one with the care component as the sole determinant of risk. The probability of an accident under this accident model possesses two variables, and is given by the function of \( p(x,y) \). This function is declining for both variables as it is assumed that the investment in care by both and of either of

\(^{133}\) Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p. 146
the two agents, will reduce the probability of harm (albeit) at a declining rate. The delimited social objective assumed under this version of the unilateral accident model is minimization of the equation for total costs consisting of care costs for both potential agents plus the expected harm costs: \( x + y + p(x,y)L \). \(^{134}\)

The unique levels of care for the two agents that minimize the above equation is \( x^* \) and \( y^* \), meaning that the social objective of total cost-minimization is achieved through incentive structures incorporating these unique and socially optimal values of care.

Under the institution of no liability the incentive structure for the potential injurer will be as described for the unilateral one. For the sake of reiteration, this agent is incentivized to set his level of care at zero which obviously is far below the socially optimal one. As a result, an excessive amount of accidents is likely to occur. As was stressed in the previous under the ‘no liability’ analysis under unilateral care the potential injurer will pay zero damages in the event of an accident regardless of his choice of level of care. Again, the potential injurer will not pay any amount of compensation for any \( x \in [0,\infty) \). The cost minimizing and optimal strategy for the economically rational and self-interested potential injurer will also within the ‘bilateral accident model with care as sole determinant of accident risk’ under the institution of ‘no liability’ be to invest zero in care as this is the value of care that minimizes the agents private expected accident costs. The situation is very different for the potential victim agents in this version of the accident model. This agent will have an optimal cost minimizing strategy of optimal precaution given the incentive structure of the potential injurer.

Now the institution of the norm of strict liability under the bilateral version of the accident model is to be considered. Here one might observe that the roles are reversed in comparison to the ‘no liability institution’ above in terms of the incentive structures of the agents. The potential injurer will suddenly have an optimal cost-minimizing strategy of investing in the optimal care level of \( x^* \) given the potential victims investment. The incentive structure under which the optimal cost minimizing strategy lies, requires of the potential victim to invest zero in care as he is guaranteed compensation regardless of his level of care. This agents’ optimal cost minimizing strategy will thus be to invest nothing in this component. Potential victims’ investment in care will solely be an incurred cost to them without yielding any private benefits. Thus, investing anything in care for these agents cannot be part of this economically rational cost minimizing agent’s incentive structure under this institution.

Another version of the strict-liability institution that is relevant under the bilateral framework is the strict lability norm with an additional feature of a defence for contributory negligence. \(^{135}\)

As the name suggest, a potential victim may be deemed contributory negligent, and by the virtue of this, barred from recovering damages from the potential injurer if their level of care falls below a court determined victim negligence norm of \( v! \). The assumption is also here that the court determined victim negligence norm is set exactly equal to the socially optimal and Pareto efficient level of \( y^* \) by the court. Under this institution the potential injurer will only pay damages of \( L \) for all the continuum of care levels \( x \in [0,\infty) \) if the potential victims’ level of

\(^{134}\) Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p. 144

\(^{135}\) Handbook of law and economics volume 1, (2007) by Steven Shavell, Mitchell Polinsky, p. 144
care was equal to or above the court determined standard of \( v! = y* \). If the potential victim level of care is below this level, the potential injurer will pay no liability damages regardless of his care level, and the accident costs will thus be shifted to the negligent victim. The joint optimal cost-minimizing strategies for the two agents under this institution with the additional defence will be to invest in optimal levels of care of \( x* \) and \( y* \). The incentive structure for the agents is an amalgamation of the one of the simple strict liability norm and simple negligence norm. As always assuming full and transparent information between the agents, the potential victim will foresee that he may have to pay for his own accident costs in the occurrence of an accident. He can “safe harbour himself” from this scenario by adhering to the ex ante court determined victim negligence norm of \( v! \). The court determined standard is for the purposes of this analysis assumed to equal the socially optimal and Pareto efficient. The potential victim is incentivised to optimality, due to the ‘shift of accident costs’-effect of the negligence defence. He will be operating at the socially optimal and Pareto efficient level of care while acting on his private cost minimizing and optimal strategy. The potential injurers will have full information about the incentive structure and optimal strategy of the potential victims, and from this predict the victims’ incentive to ‘safe harbouring’ themselves by adherence to the court determined norm. The potential injurers are therefore likely to have to bear the full accident costs and be unable to invoke the defence of contributory negligence if an accident were to occur. By the same logic as stressed in the previous, the agents will thereby have a private optimal strategy of choosing their value of \( x \) to be the one which minimizes the expected cost function of \( x + p(x,y*) \). This value is by definition \( x* \), as emphasized various times throughout his section.

Under the negligence rule within this version of the accident model, the potential injurer will as before have an optimal cost minimizing strategy of adhering to the court determined norm of \( c! \). By doing this, the agent is creating himself a safe harbour from expected liability. Due to this safe harbour of the injurer, all expected accident costs will be shifted to the potential victim in the event of an accident. The potential victim having full and transparent information regarding this scenario will have a corresponding optimal strategy of minimizing his expected accident cost function which is given by the assumed optimal value of care chosen by the potential injurer \( y + p(x*, y)L \). The value of \( y \) that minimizes this latter function by its definition is \( y* \).  

Within the bilateral accident model with care level as only determinant of risk and harm, there are many possible versions of the classical negligence rule that all lead to a Pareto optimal Nash equilibrium. For all these versions of the negligence norm, the assumption is maintained of optimal and error-free court determined norms of \( c! \) and \( v! \) exactly equating \( x* \) for the potential injurer and \( y* \) for the potential victim.

One variation of the negligence rule is the Negligence rule with a defence for contributory negligence. As the name again suggests, the working mechanisms within this model is like a

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normal negligence rule only with the additional feature of the potential injurer being able to invoke a possible defence even when his own care level has fallen short of c!. The possible defence in this case is contributory negligence from the potential victim. The negligent injurer is in other words freed from liability if the potential victim himself can be proven to have fallen short of a court determined negligence norm of v!. The optimal cost minimizing strategy for both of the potential agents within this institution is to choose their levels of x and y to equal the court determined levels. In this case, both agents’ optimal strategy is to ‘safe harbour’ themselves from liability by adhering to the optimal care level. As has been established in the previous many times, the potential injurer has a cost minimizing strategy and thereby an incentive structure, of choosing his care level to equal the court determined one of c!. By adhering to the court determined norm, he has created himself a safe harbour from liability. This strategy is as well as being the optimal one, also the dominant one because it is optimal regardless of what the potential victim chooses to do (whether he invests in optimal care or not i.e whether a defence of contributory negligence is possible to invoke or not). The potential victim having perfect information regarding the other agents’ incentive structure, will choose his corresponding optimal cost minimizing strategy based on the assumption of the potential victim adhering to the court determined negligence norm of c! = x*. The potential victim therefore expects to bear all the expected accidents costs himself, and will therefore choose his level of care to equal the cost minimizing value of the total expected accident costs function of y+p(x*, y)L. Due to the socially optimal level of care for the potential victim being the same as the court-set victim negligence norm, his optimal strategy is also the dominant one. This is because the victim’s optimal and cost minimizing strategy is the best response regardless of the actions of the potential injurer.

Even if the potential injurer does not choose his care level according to his optimal and dominant strategy of adhering to the court norm, the potential victim by choosing his level of care to equal y*, which by assumption is equal to v!, is ‘safe harboured’ from the potential injurer invoking a defence of contributory negligence.

Another version of the simple negligence rule within this version of the bilateral accident model is the comparative negligence norm. This norm stands out with its slightly differing working mechanism regarding liability imposition. Under this institution, the victim will end up as the residual bearer of accident costs if an accident were to occur and both the agents were operating at the court determined negligence levels of c! and v!. If neither of the agents were operating at the court determined level, and both therefore are deemed negligent, no single agent alone will be the residual bearer of the entire harm costs. Instead both agents are residual bearers of harm costs for a percentage or fraction of the accident costs that they have contributed in. The less care investments the respective agent has made, be it the potential injurer or the potential victim, the higher the percentage or fraction of the total liability for the accident costs will be. In other words, in the scenario of negligence on both agents, the further the respective

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agent is from the court determined negligence norm the higher percentage or fraction of the total accident costs is shifted to him. The incentive structure, and under it the cost minimizing and optimal strategy of both potential agents, is to operate as close to the socially optimal care level as possible and thereby reducing their fraction of the total accident costs. This may seem somewhat paradoxical as it is obvious that it will be no Nash equilibrium in such a scenario of both agents as negligent. It is no Nash equilibrium of both agents operating below the socially optimal level, simply because they under such a scenario could shift to an optimal and cost minimizing strategy of optimal investment in care. Put differently, a Pareto improvement is feasible which means that Pareto efficiency cannot be the current point. By switching to their optimal and dominant strategy, a Nash equilibrium where both agents are incentivized to operate at the socially optimal and Pareto optimal level of care, would result. The optimal cost minimizing strategy for the potential injurer is obviously to adhere to the court determined norm and thereby entirely escape liability from a potential accident. The corresponding optimal strategy for the potential victim as the residual bearer of harm costs in this case, will be as under the other versions of the negligence rule, namely to minimize his expected costs function of $y^* + p(x^*, y)L$, and by doing so choosing his value of $y$ to equal $y^*$. The socially optimal value of $y$ is equal to the court determined victim-negligence level of $v!$ which is a factor further exacerbating the sub-optimality and irrationality of a strategy for the victim agent to choose to operate at any level below $y^*$.

### 17 Conclusive remarks.

This thesis has focused on the mechanism of ‘Coasing’ and this mechanism’s function in relation to voluntary agreements taking place between economically rational agents. By utilizing the Coase-mechanism, the agents can repair an initial inefficient equilibrium situation, and arrive at a Pareto efficient point where both are in a better position than at their initial starting point. The concept of the mechanism of Coasing is not new in law and economics literature. However, what this thesis aims to achieve is to explicitly show through positive theory the link between liability norm structures and equilibrium outcomes achieved through the mechanism of Coasing.

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This conjugate through positive theory of the norm structures and equilibrium outcome shows in a functional analysis “the unavoidable infiltration of economics”.\textsuperscript{141} Furthermore, in addition to the functional analysis that has been presented throughout this thesis of the liability norm structures, it has been attempted to expand the functional analysis further by bringing in property rights protection under the same framework and contrasting these two options for protection. The functional analysis between the two forms of protection was on many points analogous, but important differences became visible through the comparative analysis. It was further demonstrated through positive theory, the link between property rights protection structures, liability rules protection options and equilibrium outcomes achieved through the mechanism of Coasing.

The main reason why the functional analysis of the Coasing mechanism was undertaken for both types of protection options, was to highlight the different implications of these two options for protection of rights. The functional analysis was thus also comparative in its nature. In order to make the functional analysis meaningful, the implicit assumption of clearly defined and transferable rights were maintained throughout this analysis.

One feature of importance that was highlighted under the institution of property rights protection, was that the initial assignment of an entitlements was not irrelevant. The initial position of the right was shown to have substantial wealth effects as well as be determinative of the equilibrium use of the resource in question (this was shown in the general type of Edgeworth box). A wealth effect might in the long run feed back into the economy. Further discussion and investigation of the long run effects of the wealth effect was not be pursued due to delimitation of the subject issue of this thesis. However, the reader is prompted to investigate further this interesting implication. The concept of the ‘core’ was also illustrated and highlighted and how this concept in essence is a diagrammatic illustration of the Coase mechanism in action.

A prominent and though provoking question suitable for the conclusive remarks of this thesis, is whether the basic principle of \textit{pacta sunt servandum} in civil law can be viewed as a meta theorem for the economic functional analysis undertaken in this thesis.\textsuperscript{142} By meta-theorem it is meant an overreaching theorem and fundamental axiom that lies as the foundation for the functional analysis undertaken in this thesis. If contracts or agreements are not enforceable in nature, it is not possible for the mechanisms of the Coase theorem to function in a meaningful manner because the very foundations for voluntary agreements not engrossed. This aspect


\textsuperscript{142} “Game Theory & Tort Law”, by Gunnar Norden, Phd Course, Copenhagen Business School, Nov. 17-18 , (2016).
highlights the interdependence and propinquity of the field of law and the subject of economics, as the economic models cannot survive in any meaningful way without the core foundations of contract law. In this case, the illuminating example of the interdependence of the two fields is the fact that legal foundations and principles such as ‘pacta sunt servandum’ and clear and unequivocally defined rights are meta theorems positioned above the Coase Theorem and the economic models. Without the legal meta theorems, the economic models and working mechanisms will be futile as they require the assumption of enforceability of contracts (or agreements) and rights.

The year today is 2017, and we live in a rapidly evolving society both technologically and socially. One consequence of this evolutionary Zeitgeist, is the need for frequent and periodic review of legal rules and principles to match this progress. The periodic review process does of course not always keep up with the fast pace of the technological and other advancement, and the result is sometimes unfair or poorly fitting application of legal rules. It should be noted that I am not stressing objective fairness notions. This is by itself a highly complex and illusive concept to attempt to discuss or analyse. Rather I am referring to subjectively felt unfairness by agents who are affected by the lagging pace of the interpretation of legislation and/or legal principles. The lagging Zeitgeist problem of legal rules within tort liability law specifically, arguably makes this field of law unpredictable for potential agents. One potential solution to the latter problem is to implement theoretical concepts of economics that arguably are immune to the moving Zeitgeist within tort liability law.

A significant part of the discussion in this thesis was dedicated to the negligence norm, as this institution is susceptible to many types of uncertainty in general. The consequences of uncertainty and especially legal uncertainty was discussed and analysed within an economical accident model framework. The normative implications of this legal uncertainty will also be analysed. An inquisition that implicitly underlined this analysis was the normative question of whether there is any way to make the legal uncertainty of the negligence norm diminish in magnitude and severity. Could implementation of more objective economic concepts and models in the legal decision-making process of the negligence norm make it more transparent and predictable for potential agents and thereby reduce legal uncertainty? If so that the legal uncertainty is reduced by this measure, but not completely eliminated, it follows from the analysis in a previous chapter on the ‘stochastic negligence norm’, that the result will be a contracted concentration of the distribution of the negligence norm. Such a contracted distribution will by assumption lead to socially sub-optimal investment in care components for potential injurers. A dispersed concentration of the distribution of the negligence norm, which is the curve one expects with a high degree of legal uncertainty, will on the contrary lead to deficient investment in care components. Whether or not over-precaution or under-precaution
is more problematic in terms of Pareto efficiency is difficult to ascertain. Both sub-optimalities are socially sub-optimal and represents wastage in society.

My conclusive proposition in relation to this is that the only way to ascertain the better option is to investigate the relative wealth effects of excessive precaution (occurring under contracted legal uncertainty) and deficient precaution (occurring under the dispersed stochastic negligence norm) by potential insurers. Over-precaution will have the wealth effect of making the potential victims wealthier, whereas under-precaution will have the opposite effect of making potential injurers wealthier. Notwithstanding this, I emphasise the importance of such potential explicit implementation of economic models and concepts being transparent in public documents such as premises of legal decisions. Transparency and publicity is imperative for the consequence of increased certainty and predictability for potential agents to occur.

The negligence norm within Norwegian tort law is non-statutory, and includes both wilful acts and negligent ones. The norm is derived from jurisprudence and legal theory where the overreaching question in the court determinacy is whether the potential injurer should have reacted/acted differently in the respective situation. The assessment is usually grounded in the so called ‘reasonable man standard’ that asks what a reasonable man would have done in an identical situation. It goes without saying that the reasonable man measurement is theoretically very problematic and chimerical. The assessment that a court is supposed to make under this measurement is prone to subjectivity and discretion, and even when the reasonable man standard is supplemented with guidelines, the inherent subjectivity in the concept is striking.

The ‘reasonable man concept’ is by no means is self-explanatory or open to any kind of collective intuition, despite the efforts of some legal scholars to argue in such a direction. If one removes the veil on the reasonable man standard, it is more apparent why this concept is not univocal to any universal human intuition. What constitutes a reasonable man must be anchored to something that is theoretical and objective in nature. This is because what is a reasonable man varies greatly both in opinion for different people and along with the Zeitgeist. For instance, in a given situation where there is potential for harm to occur, a potential injurers behaviour, and whether or not this is in line with the reasonable man, depends on the subjective characteristics and features of the potential injurer in question. If the potential injurer is far below average in his mental capabilities, what is reasonable given his subjective skillset is different form an agent with far above mental capabilities.\textsuperscript{143} The reasonable man is inherently vague and context dependant, thus impossible to quantify, compare and predict. The proposition of the law and economics doctrine is that it would be value added to the field of tort liability if

the reasonable man concept could be anchored to a theoretical objective provision such as an economic formula. Such an objective provision requires the assumption of some delimited goal or objective. This objective could very well be economic efficiency in the Pareto efficiency sense, as this harmonizes well with the fairness and compensatory notions that are main pillar principles behind Norwegian tort legislation. One could at least argue that such an objective of economic efficiency is just as sound and purposeful as any other possible objective. Pareto efficiency is at the very least quantifiable and measurable in mathematical terms. This permits verifiability of the efficiency of legal norm in question, since it is possible to numerically measure whether or not the delimited goal has been obtained.

Another principle that is embossed in Norwegian tort liability law is ‘deterrence from undesirable and negligent behaviour’. This principle is especially well embodied in and synchronized with the economic accident model with the delimited social goal of Pareto efficiency. One of the main propositions of this model is that economically rational agents are incentivized in different directions under the different legal institutions. Optimal incentives will result in Pareto efficiency according to the economic models, and this is achieved through courts setting the legal norm correctly.

The economic theory of law blame legal uncertainty as one of the reasons why socially desirable optimal deterrence of the potential agent will not always occur. As has been discussed in the previous, one possible remedy for such uncertainty is a higher degree of transparency of the variables used in the negligence determination which again is easier to achieve with objective values.

The reasonable man-concept will easily fall victim to the moving Zeitgeist of the law. What is considered a reasonable man in today’s contemporary society in different areas of activities will in most cases change with the changing available technology and expanding body of knowledge. Even social widely accepted norms on what is a reasonable man in a given situation is easily moved in pace with the moving Zeitgeist of this respective area. A prominent example of the latter might be the recent years increased emphasis in Norwegian tort law on subjective psychological features of injurers. Society in general has been more inclined to accept a variety of smaller psychological deviancies present in injurer agents as extenuating circumstances in some way. This ‘spirit of the times’ is may lower the negligence standard in certain instances if the court has been picked up on this spirit. The converse may also be the case where the court system is not sufficiently fast-absorbing and elastic in terms of the rapid pace of today’s society’s Zeitgeist. Whichever of these scenarios might result, the likely consequence is that the Zeitgeist phenomena further contributes to making the legal norm difficult to predict in an ex ante manner for a potential injurer. Economical values and variables as the ones used in the
economic accident model on the other hand are far less likely to be affected by the moving Zeitgeist.

The economic proposition that can be derived from the economic accident model is that there is a certain level of care that is socially optimal in terms Pareto efficiency that it is optimal for the potential agents to be incentivised to invest in. This point is where the marginal cost of care undertaken by the potential injurer, equals the marginal decrease in expected accident costs. The latter represents the socially optimal value of precaution that the court should aim to set their negligence standard equal to. In other words, the economic accident model provides for a mathematical formula equating Pareto efficiency in which to base the ‘reasonable man’-standard on. Such a formula allows for increased certainty of the norm because it allows for an objective mathematical measure of whether the ‘reasonable man’-standard has been met or not. Furthermore, such a formula would increase transparency ex ante for potential injurer agents if they were incorporated into the Norwegian tort legislation. The very fact that the negligence norm in Norwegian liability law is non-statutory makes it prone to uncertainty and subjectivity. In this respect, the theoretically most efficient way to increase certainty through the use of objective economic models, would be to replace the anchoring of the negligence norm from non-statutory to statutory. In the statutes, economic accident models, principles and considerations could then be implemented as mandatory principles for the court determined negligence norm. Statues are published and therefore easily accessible to the public. The latter would further increase the transparency of the norm itself.

I want to address a common attack that frequently gets launched on reductionist models and theories in general, thus also the economic accident model. The typical criticism stresses that the economic accident model is not possible to meaningfully generalize to real life liability cases. However, in my opinion this critique of the economic model is rather a positive quality and thus one of its strengths. The very fact that the economic accident model is highly reductionist and simplified is what makes the model applicable as a theoretical working model capable of yielding quantifiable results. The real world and the agents in it are truly chaotic and unpredictable. Thus, a task of constructing a ‘perfectly realistic’- theory that takes into account all this chaos is impossible. Due to the unattainable task of creating a perfectly realistic model,
the next best alternative is to utilize a simplified model that at least capture the most important and common phenomena in the real world. The results yielded from these reductionist models will on average be correct and in line with reality, thus provide highly valuable results that at the very least are profoundly directional. Furthermore, there is nothing standing in the way of a legal decision-maker to make a simplified economic accident model even more comprehensible and realistic by supplementing it with additional variables of systematic deviant and irrational behaviour of potential agents. Illustrious examples of such possible supplements that potentially could be incorporated, are the behavioural economics phenomena which were discussed in the later chapters of this thesis.

As mentioned in the introductory remarks of this thesis, a real-life example of explicit court implementation of the economic accident model is Learned Hand formulation of negligence derived from the common-law case of United States v. Caroll Towing Co. In its refined form of marginal values (proposed by J.Brown (1733)\textsuperscript{148}), it mirrors the economic accident model and its implications almost to perfection. The formula is written out as $\Delta B < \Delta PL$, where $B$ is the marginal burden to the potential injurer of precaution, $P$ is the marginal probability for the occurrence of an accident and $L$ is the marginal magnitude of losses. For a potential injurer to be deemed negligent the marginal burden to him of taking sufficient precautionary measures must be proven ex post to have been lower than the value of the product of the marginal probability for accident occurrence and the magnitude of losses.\textsuperscript{149} The marginal Learned Hand formula is a good example of how an economic mechanism might be boldly and explicitly integrated into judicial adjudication. Notwithstanding, it is highly unrealistic that such a bold approach in near future even will be considered in Norwegian civil courts. Whether their conservatism is rationally-founded is debatable. A formalistic and objective economical accident model poses no threat to the foundations of Norwegian tort liability law. Rather, I believe it reinforces this infrastructures’ core principles, heightening them to a more scientific level.

As has been stressed previously, a more subtle and realistic way to explicitly incorporate an economic accident model as a valuable tool in practical legal settings is to make these models a weighty source of law when determining the negligence standard on a case to case basis. Making the main source of law for the non-statutory provision of negligence an objective, mathematical and technical economic accident model anchors this norm to a more sound and predictable scientific foundation. It furthermore makes verifiability of the delimited objective of the institution feasible.

\textsuperscript{149}https://cyber.harvard.edu/bridge/LawEconomics/neg-liab.htm
Since the sources for determination of the court determination of the negligence norm is non-statutory within Norwegian Tort Law, adding the objective economic accident model as a main source of interpretation will not infringe upon any existing values assumed to underpin Norwegian tort law. In fact, being non-statutory and influenced by a multitude of sources of law, one could imagine making economics and the economic accident model a type of lex superior-source of interpretation for the negligence norm. In such a scenario, if an especially difficult of atypical negligence case should come before the court, additional lower and more subjective considerations could be incorporated and supplement the economic model. One could argue that such a hypothetical approach would be better suited than the current one at accommodating the rapidly changing and evolving societal climate of today and thus the moving Zeitgeist of contemporary society that greatly influences the field of law. The unavoidable moving Zeitgeist required legal principles to inhibit the properties of both flexibility and certainty, and the proposed solution above could arguably be a step in this direction. Of course, this thesis does not go in enough depth to harvest readily applicable mechanisms of this sort. It is however hoped that the presented analysis throughout this thesis and its various chapters prompts motivation to investigate this normative issue further and in more depth. It is hoped that this thesis has raised some awareness around some conspicuous points within the law and economic field.

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