ESSAYS IN LAW AND ECONOMICS

BY

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ABSTRACT

The thesis consists of four chapters concerning different topics of Law and Economics.

The first chapter deals with economic issues in competition law. In order to distinguish predatory pricing from competition on the merits, the courts in the United States and in the European Union have established cost-based tests that also include an assessment of the market structure. The tests miss a causal connection between conduct and foreclosure. In contrast, Australia and New Zealand make use of a counterfactual analysis that establishes causality. However, the causal connection there relates to the market power and the conduct, and does not answer whether the conduct has only been done because of the foreclosure effects. A counterfactual test could be useful in predation cases if it establishes a causal link between the profitability of the conduct and the foreclosure effect.

The second chapter explores the effect of excluding tort law for workplace accidents. In countries with workers' compensation schemes, employees receive compensation for injuries at work regardless of fault, while private law liability of employers is either limited or fully excluded. The degree of liability matters for workplace safety, and different legal arrangements influence incentives of employers and employees to take care. An empirical analysis of several jurisdictions reveals a consistent pattern. The combination of arrangements that increase private law liability and mitigate moral hazard seems to be important for safety at work. No-fault workers' compensation with the benefit of effective compensation comes with a cost: more injuries of those, which it seeks to protect.

The third chapter assesses the effect of no-fault automobile insurances on safety incentives. In order to examine how no-fault motor vehicle insurance affects accident rates, insurance regimes in various countries are compared. A random effects model on fatality data of 29 countries reveals that some motor vehicle insurance systems increase moral hazard. The incentive to take care seems not to be negatively affected by no-fault rules, but by moral hazard due to limited experience rating. Restrictions on experience rating lower the level of care taken by motorists. A combination of no-fault insurance and flat-rate premiums, as found in New Zealand or the Northern Territory in Australia, has a detrimental effect on the safety of roads.

The fourth chapter primarily builds on the finding of the second chapter that the exclusion of tort law for workplace injuries results in higher accident rates. In this respect, the question arises whether health and safety regulation can counteract the detrimental effect by providing deterrence from criminal sanctions. This is particularly relevant for New Zealand where a tendency of the law towards a reliance on regulation and criminal law can be observed. In practice, however, criminal law cannot fully replace common law in establishing incentives to take care, and is not as effective as private law actions.

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Preface – Law and Economics in New Zealand

Law and Economics, which is the economic analysis of law (Rubin, 2008), is an evolving subject in New Zealand. The topic has certainly received most attention in the United States. The foundation of the modern approach to Law and Economics has been laid by the two American scholars Ronald H. Coase and Guido Calabresi in the early 1960s with their seminal publications (Coase, 1960; Calabresi, 1961). The importance of economics for the law has been discovered much earlier, though, by a Supreme Court judge who stated in 1897 that the future expert of the law "is the man of statistics and the master of economics" (Holmes, 1897, p. 1001). Today, Law and Economics is widely taught at law faculties across the United States (Richardson, 2002, pp. 157-8). The field of economics receives much attention in legal research. Courts often refer to the subject in their decisions, and famous scholars of Law and Economics are found amongst judges. Lawmakers and politicians pay also close attention to the economic effects of legislation. In short, Law and Economics is seen as having practical value in "promoting good lawmaking" (p. 158).

The subject of Law and Economics becomes increasingly important in New Zealand as well. Here, most of the debate takes place in the academic world, though. Rare considerations of economics are found in court decisions, and the legislator is only occasionally concerned about efficiency (Richardson, 2002, p. 158). A wider discussion of economic implications of laws would be desirable. This thesis seeks to provide examples of areas where a law and economics analysis can provide useful insights for the effectiveness and efficiency of laws.

This preface gives a brief overview of the implications of Law and Economics, and then describes where this subject is particularly interesting in the New Zealand context. This leads to an outline of the following chapters explaining the reasons for choosing the topics of the thesis. Then, the topics are explained in more detail, before the methods used in the thesis and the conclusions from the chapters are presented.

1 Implication of Law and Economics

Law and economics are closely related. Both fields are concerned with the behaviour of individuals and firms in a world with limited resources. Indeed, there are many "parallels and overlaps" between the legal system and the studies of economics (Posner, 1989). Law defines the boundaries of rights and obligations so that the ideal outcome would be a just and fair distribution of resources. Economics seeks to find the efficient, or socially optimal, use of resources. These are two perspectives of the same problem. Efficiency and equity do not necessarily contradict each other. More often than not, what is socially optimal may also be found to be just and fair. What the law does, affects the economy; what economics predicts, can affect the law. As Easterbrook (1989) notes, law and economics are "inseparable".

Apart from adding scientific methods to legal assessments, economics has two functions for the law (cf. Cooter and Ulen, 2012, pp. 1, 9). First, economics provides for concepts to shape economy and society. The law is a means to put the ideas of economists into practice. Typical examples for economic laws are taxes, industry regulations, and competition law. These fields of law are applied economics. Second, the methods of economics can be used to analyse traditional areas of laws, such as contracts, torts, property, or criminal law. Economics can evaluate whether the rules are efficient, and how they shape incentives of individuals and firms to behave in a socially optimal way. Economic analysis of law addresses the question how legal rules affect the behaviour of relevant actors, and whether the effects of legal rules are socially desirable (Kaplow and Shavell, 2002, p. 1666). This function is not inherent in law, which is concerned about the effect of past actions for individual subjects. In contrast, economics is concerned about the future consequences of law for society (Veljanovski, 2007, p. 8). This thesis covers both functions of economics for legal research. The first chapter concerns competition law and analyses how it deals with the concept of predatory pricing. The remaining chapters focus on the role of tort law to set incentives to take care.

Economics also distinguishes between normative and positive theory (Richardson, 1998, p. 66). In Law and Economics, positive theory describes the effects of the law, or conjectures how people behave and make decisions under certain circumstances. Normative theory predicts whether an intended change in law

is efficient, or states that rules should be changed in order to maximize utility. This distinction as such is valuable, but not very beneficial for deciding on an approach to research in Law and Economics. Normative theory necessarily includes the positive approach as a first step, and positive theory inevitably raises normative conclusions, although they do not need to be expressed: if a law has unintended consequences one may claim that it should be changed. The chapters of this thesis thus include both elements. Although positive theory is the main focus, conclusions for optimizing the law are made as well.

2   The New Zealand Context

Two topics of Law and Economics are specific in the context of New Zealand law, and are used as subjects of this thesis. One is a particular approach to competition law. New Zealand's competition law can be seen as a compromise between the approaches of the United States and of the European Union. While the legislation conforms to the European or British legislation, judgements frequently refer to the courts of the United States. The treatment of unilateral actions of dominant firms is a particular feature of New Zealand law, which is in this respect similar to Australian competition law, but different from that of the United States and Europe. In short, New Zealand law as applied by the courts requires a counterfactual analysis next to a test of dominance, while Europe treats certain unilateral conduct with a per se rule, and the United States require a recoupment test.

The other topic that is particular is accident compensation and the exclusion of tort law for personal injuries. New Zealand has a comprehensive accident insurance system that is unique in the world. The initiation of the scheme can be understood as an expression of the egalitarian approach of politics during large parts of the twentieth century (Lichtenstein, 1999). Historically, New Zealand has been regarded as an egalitarian society (Nolan, 2007), and the ideal of equality can also be seen as central component of the accident compensation scheme: every injured person should receive an equal level of compensation regardless of accident cause, fault or working status. The accident law influences all areas of life, such as employment relationships, road traffic, or even leisure activities. The thesis focuses on the effects of the compensation scheme on accidents at work and on the road.

Since both areas are covered in other countries by comparable schemes as well, the economic effects of compensation laws can be evaluated across countries.

3   Outline of Chapters

The application of economic concepts by courts is subject of the first chapter, which takes competition law as an example for this perspective of Law and Economics. It evaluates the application of the economic concept of predation by courts in different countries.

The next two chapters follow the second approach of Law and Economics. The core idea is to analyse the effects of the exclusion of tort law under certain accident compensation schemes. The aim is to elaborate which role tort law can play for the welfare of society. Tort can relate to different types of accidents. It can involve accidents in which only one party is injured and this is due to negligence of another party. This situation differs from accidents where both parties are involved in the accident and may be harmed. A typical situation of the first type of accidents are injuries at work where the employer has the ability to provide a safe workplace, but failing to do so will increase the risk of others (the workers) to be injured. The second type of accidents is exemplified by car accidents, which involve at least two parties that can both be negligent and be harmed.

The fourth chapter adds to the insight that moral hazard from missing tort law liability increases accident risks. It evaluates whether regulation and criminal law can replace tort law. This addresses the question how the economic effects of private law compare with those of criminal law.

4   Application of Economics in Competition Law

The topic of the first chapter, predation in competition law cases, is widely debated in both economics and law. A seminal paper by Areeda and Turner (1975) presented a predation test that was relatively easy to apply and hence was quickly adopted by courts in the US, EU and commonwealth countries. However, the application of that test by the courts in those jurisdictions differs in detail with significant consequences. Further, the discussion about the 'right' test of predatory

behaviour has not stopped, and new concepts and applications are still being developed by academics and governmental institutions. The New Zealand Supreme Court established a counterfactual analysis, which is unique in comparison with US and EU law. This test has been analysed and criticised by scholars and lawyers alike. Unrelated to this development, the European Commission recently proposed a similar counterfactual test in connection with its effects-based approach. The chapter identifies those parallel developments for the first time and analyses similarities and differences. It carves out the merits of a counterfactual analysis for predation, and foreclosure conduct in general.

The hypothesis of the first chapter is that a counterfactual analysis as applied by the NZ Supreme Court and as suggested by the EU Commission can show a causal connection of the firm's conduct and the market effect, and hence suits a more economic effects-based approach. It is suggested that such a counterfactual test could be useful in predation cases if it establishes a causal link between the profitability of the conduct and the foreclosure effect. It should be asked whether the price setting is not profitable but for the foreclosure of competitors.

5   Legislation on Accident Compensation

The topic of remaining chapters, tort law and accidents, has also been widely analysed. The general framework of tort has been covered extensively. The more specific issue of no-fault schemes replacing tort law has repeatedly received attention when respective tort reforms where introduced. For example, the introduction of the New Zealand Accident Compensation Scheme was based on welfare considerations in the so-called Woodhouse report. Its recent reform was again accompanied by various assessments of observers (cf. the 'ACC stocktake' of the NZ government), and further analyses finds that New Zealand ranks badly for occupational safety performance in comparison with other OECD countries. This suggests that the introduction of no-fault schemes might result in more problems than those, which it seeks to resolve. More specific compensation schemes, such as no-fault rules for car accidents in some Canadian states, have been assessed during their introduction several decades ago. Others, such as occupational no-fault schemes, are more frequently analysed and evaluated against their effects.

What is missing is an overarching analysis that brings those loose ends together. It is paramount to understand that there cannot be one general statement on the effects of tort or no-fault schemes respectively. Different observations in regard to different scenarios of tort can be expected. Car accidents will evoke other economic considerations than accidents at work. The study does not suggest either tort law or no-fault compensation as an optimum policy. Rather, the precise methods to mitigate moral hazard are essential for safety.

A further gap in the economic literature, that these two chapters try to fill, can be seen in the analysis of actual effects. Theoretically, it is quite well established that no-fault schemes are associated with an increase in accidents, but come with lower administrative costs (efficiency) and guarantees compensation of victims (equity). Factual assessments of accident statistics only result in recommendations for more regulation, but barely touch the effects of tort law. Such an analysis requires the comparison of accident numbers in different countries with different legal systems. There are few cross-country studies as to whether the figures of countries with different schemes imply that tort law could have an actual effect on the incentives of individuals and firms.

6 Trend towards Efficiency

From a Law and Economics perspective, it may appear odd that different jurisdictions maintain different legal regimes. In a way, it seems, only one solution can be correct. But still these differences persist and different researchers come to contrasting evaluations of these regimes. This is not necessarily incoherent. Rather, different legal regimes compete with each other. There is unlikely to be an optimal solution that prevails in all circumstances. By competing, the outcomes of the legal rules can be compared, and worse regimes can be optimized. Over time, one may expect to see a conversion of the different rules towards an optimal equilibrium. As Posner (2007, pp. 25-6, 569) postulates, court decisions over time make the law efficient. Inefficient laws will more frequently be challenged and so give opportunities and incentives for judges to amend the rules. Although this observation was developed for the common law system, it may equally be valid for civil law jurisdictions (Michelmann, 1980). The idea can be extended to include the legislative process (Backhaus, 1997). Assuming a perfect legislative process, legislators, which

compete for votes, theoretically face incentives to produce long-term wealth increasing laws. Countries can learn from other jurisdictions which rules produce superior results. However, the efficiency of the common law and the legislative processes has been challenged (e.g. Friedman, 2000, pp. 297-308). Some authors point out that rent-seeking activities by special interest groups may undermine the law finding process (Tullock, 1967; Crew and Twight, 1990). Labour unions, industry associations, or other interest groups are able to lobby for the positions of their members more effectively than the general public. The interests of these groups may find more attention in the law making process than the diffused interests of the entire society. For example, Olson (1982, p. 70) mentions that trial lawyers in many US states successfully opposed the implementation of no-fault automobile insurance that would have reduced the extent of litigation. In response to this valid critique, it should be pointed out that often different special interest groups with opposing positions exist, which might mitigate some of the rent-seeking effects. Also, in the very long run, substantial inefficiencies due to rent seeking can result in failure of policies or entire states (the recent insolvency of Greece is one example for such an extreme outcome). When the failure of the law to optimize overall welfare becomes apparent, public pressure and the reality of adverse economic outcomes might force lawmakers to initiate legal reforms. A complete discussion of the efficiency of the law and the relating public choice debate is outside the scope of this thesis. The thesis will however show that in the case of no-fault legislation in New Zealand inefficiencies in insurance laws exist, which other areas of the law seek to compensate.

The fourth chapter addresses the efficiency trend in relation to injury compensation laws of New Zealand. It builds on the findings of the Chapters 2 and 3 that the abolition of tort law decreases safety incentives. The hypothesis of this section is that New Zealand's law may increasingly make use of regulation and criminal law to recreate incentives to take care. It is, however, questionable whether regulation and criminal sanctions can substitute for the missing deterrence effects from tort law. This question is too complex to deal with in a conjoined assessment and warrants an own chapter.

In that chapter, it is observed that the accident compensation regime moves towards rules that employ more incentives to take care. Because of New Zealand's pure no-fault system, the deterrence effect of tort law is missing. Specific regulation and criminal sanctions increasingly try to fill the gaps. In addition, instruments to mitigate moral hazard are introduced, such as experience rating for employers and risk-based vehicle classes. None of these approaches are perfect substitutes for tort law incentives. But they show that the law in form of legislation and judiciary seeks a way towards more efficient outcomes. This suggests that the radical approach of New Zealand to abolish tort law cannot be an efficient strategy in terms of achieving an optimal level of safety.

7 Methods

As the chapters use different approaches to Law and Economics, different methods are utilized. The first chapter contains a qualitative analysis and discusses the legal arguments and economic theories on predatory conduct of market dominant firms. The second chapter makes use of descriptive statistics and standardisation of multi-jurisdictional workplace accident data. The third chapter employs more advanced econometrics and applies a random effects regression model to cross-sectional time-series data for road fatalities of different countries. The fourth chapter is a discussion of empirical evidence on trends of criminal sanctions and summarizes research findings from surveys on employers' attitudes towards safety.

8 Conclusions

The particular approach of New Zealand law to certain economic issues makes a good case for the studies of Law and Economics. The contrast to other countries and their approaches allow for assessing the efficiency of different rules.

The application of the counterfactual test to exclusionary conduct of market dominant firms can be defended on efficiency grounds, with slight modifications. The courts have to date preserved a decision rule under sec. 36 Commerce Act that resulted in economic correct and efficient outcomes of cases. As it turns out, other jurisdictions, like the European Union, may benefit from a similar approach.

In contrast, the unique accident compensation scheme with the exclusion of tort law results in inefficiencies. Due to New Zealand's comprehensive no-fault system, safety levels are lowered as incentives to take care are reduced. The detrimental safety effects can be seen in the domains of workplace accidents and road traffic injuries. Empirical evidence confirms the predictions of the analytical frameworks on tort law. Finally, the argument that missing deterrence from tort law could be replaced with deterrence from criminal sanctions can be rebutted in the New Zealand context.

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Chapter 1 – Counterfactual Analysis in Predation Cases[*]

Abstract

In order to distinguish predatory pricing from competition on the merits, the courts in the United States and in the European Union have established cost-based tests that also include an assessment of the market structure. Those tests can be criticized for being too static and for potentially including pricing behaviour, which does not have foreclosure of competition as the main effect. The tests miss a causal connection between conduct and foreclosure. In contrast, Australia and New Zealand make use of a counterfactual analysis that establishes causality. However, the causal connection there relates to the market power and the conduct, and does not answer whether the conduct has only been done because of the foreclosure effects. Similarly, the new European effects-based approach advocated by the European Commission entails a counterfactual analysis, which is related to the profitability of the conduct. This paper suggests that such a counterfactual test could be useful in predation cases if it establishes a causal link between the profitability of the conduct and the foreclosure effect. It should be asked whether the price setting is not profitable but for the foreclosure of competitors.

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[*] This chapter has been published in the *European Competition Law Review*, [2013] E.C.L.R. 410.

I.   Introduction

The distinction between anti-competitive and pro-competitive behaviour of dominant firms has been subject to debate since the formation of rules on unilateral conduct. Predatory pricing is an illustrative example because lower prices as such benefit consumers and are an intrinsic goal of competition law.[1] On the other hand, lowering prices in order to eliminate competition may constitute an abuse of market power. The difficulty is to separate exclusionary conduct from competition on the merits. This issue has been described as a dilemma,[2] which competition law practice often fails to resolve. The following comparison of the approaches in different jurisdictions illustrates this dilemma, and shows that none of the approaches solves it perfectly.

The courts in the United States and in the European Union have developed rules based on certain cost levels, which are aimed at providing a guideline for the distinction of predatory pricing from legitimate competition. In contrast, the courts of Australia and New Zealand make use of a counterfactual test for finding exclusionary conduct. Moreover, the recent discussion in the European Union favours an effects-based approach that also entails counterfactual elements for the tests of exclusionary unilateral conduct. It has been argued that counterfactual tests produce more harm than good, and should not be used when dealing with unilateral conduct.[3] This paper contrasts that position by highlighting some beneficial points of counterfactual analyses for predation cases.

Counterfactual analysis is traditionally used in many areas of the law, such as torts or criminal law, to show a causal connection between an event and its effect.[4] A counterfactual, or "but for" test asks the hypothetical question how the situation would be like if a certain event did not happen. If the outcome had not happened but for the event, the causal connection between event and outcome is established. In competition law the counterfactual test is often applied in merger cases to see whether the merger would cause market distortions. In this respect it is asked what

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[1]   Kobayashi, *The Law and Economics of Predatory Pricing*, in: Hylton (ed.) *Antitrust Law and Economics* (2010) p. 116 provides a review of economics and practice on predatory pricing.

[2]   Bolton/Brodley/Riordan, *Predatory Pricing: Strategic Theory and Legal Policy*, (2000) 88 Geo. L.J. 2239.

[3]   Veljanovski, *Market Power and Counterfactuals in New Zealand Competition Law*, (2013) 9 Journal of Competition Law and Economics 171.

[4]   Strassfeld, *If...: Counterfactual and the Law* (1992) 60 Geo. Wash. L. Rev. 339.

the outcome of the merger was compared to the counterfactual that the merger would not proceed.[5] This concept can be applied to unilateral conduct: if the market outcome was not the same but for a certain condition (for example a firm's conduct, or its market power), the condition is the cause (*sine qua non*) of the outcome.

This paper analyses different approaches to identify predatory pricing strategies, and highlights the advantages or disadvantages of the counterfactual analysis in predation cases. It starts with a brief outline of the presumption rules that have been established in the United States and in Europe. Those rules are then compared to the counterfactual methods in Australia and New Zealand. Finally, the European effects-based approach and its implied counterfactual analysis for predatory pricing are discussed.

II. Established Presumption Rules

In order to determine whether a price setting is anti-competitive, the courts in the United States and in the European Union have established cost-based tests. If a firm having or acquiring dominance offers its products under the costs of production, the firms' price setting is presumed to be predatory. The actual or potential effect of the price setting on the market is of no relevance for the presumption of illegality. The presumption rules hence simplify the difficult question whether or not a certain price setting is anti-competitive. In theory, a price can easily be compared to cost. Answering the question how a price may affect competition in the market is a more complex task. This question might still be relevant though if the firm seeks to rebut the presumption by demonstrating that the price setting is in fact efficient. In the following it is briefly outlined that whilst the cost tests are similar in both jurisdictions (below 1), the additional prerequisites as to market power differ (below 2). The possible justifications and efficiency defences are again similar (below 3).

1. Cost Threshold Test

The first prerequisite for predation is that a firm sets the price for a particular product below its cost. The benchmark for below-cost pricing predominantly applied in practice is average variable cost (AVC). This threshold has been developed by Areeda and Turner, which from a theoretical point of view regarded below marginal

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[5] For EU merger control see Geradin/Girgenson, *The Counterfactual Method in EU Competition Law: The Cornerstone of the Effects-Based Approach* (2011), available at ssrn.com/abstract=1970917, p. 3-6.

cost production as an appropriate measurement for predation (hence the test is often referred to as Areeda-Turner rule).[6] Because of practical difficulties to measure marginal cost, they recommended to test the price against average variable cost that come close enough and often will be identical to marginal cost.

The Areeda-Turner concept is based on the understanding that an established firm would normally not offer below its AVC. Rather, if it could not meet AVC, it would prefer to leave the market. The production of each further unit would increase the firm's loss. The most likely rationale for such a price setting by an established firm with established products is predation. In contrast, there are multiple legitimate business reasons to price below average total cost (ATC) if AVC is covered.[7] Parts of the total cost might be sunk and could not be avoided by giving up the production. Likewise, other products could be able to compensate for total cost. It would become highly speculative to assume predation for pricing under ATC when at least AVC is covered. Likewise, pricing above AVC should, as such, not allow a presumption of illegal behaviour.

US law has confirmed the Areeda-Turner rule on several occasions. In the landmark decision *Brooke Group* the Supreme Court reinforced the concept that for a violation of Sec. 2 Sherman Act or Sec. 2a Clayton Act prices must be set below an appropriate measure of cost.[8] The court rejected "the notion that above-cost prices that are below general market levels or the costs of a firm's competitors inflict injury to competition cognizable under anti-trust laws." According to the court, "[a]s a general rule, the exclusionary effect of prices above a relevant measure of cost either reflects the lower cost structure of the alleged predator, and so represents competition on the merits, or is beyond the practical ability of a judicial tribunal to control without courting intolerable risks of chilling legitimate price cutting."[9] As long as a price remains on or above a competitive level, a price drop cannot be condemned "[e]ven if the ultimate effect of the cut is to induce or reestablish supracompetitive pricing."[10]

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[6] Areeda/Turner, *Predatory Pricing and Related Practices Under Section 2 of the Sherman Act* (1975) 88 Harvard L. Rev. 697.
[7] This implies a test on short run periods as in the long run all cost are deemed variable.
[8] *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209 (1993).
[9] Ibid., at p. 223.
[10] Ibid., at p. 224.

In the more recent *American Airlines* case, the government's attempt to modify the test was rejected by the courts.[11] The DOJ had claimed that American Airlines engaged in predation by increasing seat capacity on selected routes, which have been targeted by an entrant. Since the incremental cost for the additional seats have not been covered, American Airlines had sacrificed profit. However, its average variable costs were covered, and the courts were not willing to forgo this strict cost based test.

The European Court of Justice has established a rule similar to the US jurisprudence. The well-known AKZO judgement[12] set out a three-fold test for predatory pricing: a dominant firm's price is presumed to violate Art. 102 TFEU if it is below AVC; the contrary presumption that there is no abuse of market power is valid for prices that are set equal or above ATC. In the range between AVC and ATC, a dominant firm can be held to have violated competition law only if its intent to deter competition can be proven, for example by presenting internal documents. The possibility of pricing above AVC being predatory still remains within the Areeda-Turner logic that excludes this pricing only because it is ambivalent and could have legitimate business reasons. However, if intent can in fact be proven, this ambiguity is resolved. Some US courts have similarly to the AKZO test also accepted predation when prices are set between AVC and ATC and intent to predate can be established.[13]

In economics, there have been several suggestions for exact cost benchmarks. According to Baumol, average variable cost should be interpreted more precisely in the form of average avoidable costs (AAC).[14] Hence, some of the total cost of production would be included in the cost threshold, as they could not be avoided if production were given up. Joskow and Klevorick have suggested that average incremental cost would be a more appropriate measure for the upper threshold in the

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[11] US District Court for the D. of Kansas, *United States of America v. AMR Corporation, American Airlines, Inc., and American Eagle Holding Corporation*, 140 F. Supp. 2d 1141 (2001), upheld on appeal: US Court of Appeal, 10th Circuit, *United States v. AMR Corp.,* 335 F.3d 1109 (10th Cir. 2003).
[12] ECJ, C-62/86 *AKZO Chemie BV v Commission* [1991] ECR-I 3359.
[13] Cf. Bolton/Brodley/Riordan, op. cit., (2000) 88 Geo. L.J. 2239 (2271).
[14] Baumol, *Predation and the Logic of the Average Variable Cost Test*, (1996) 39 J.L & Econ. 49 (58-59): As the issue of predation is that an efficient firm is driven out of the market, the test should be based on the costs that this firm can avoid by leaving.

most likely context of multi-product firms.[15] Those two benchmarks seem currently to be preferred by most observers.[16]

The courts on both sides of the Atlantic do not exclude any cost standards, but rather reserve the possibility to adapt the thresholds to the circumstances of the particular case. In *Brooke Group*, the US Supreme Court merely referred to an "appropriate measure" of cost, and explicitly declined to "resolve the conflict among the lower courts over the appropriate measure of cost".[17] Similarly, the case law of the European Court of Justice allows for benchmarks other than AVC or ATC. In *Post Danmark* it considered incremental costs as a possible benchmark.[18] The European Commission also follows the recent literature. In its 2009 guidance, AAC and long-run average incremental cost (LRAIC) are put forward as the most appropriate benchmarks.[19] For the analysis in this paper, the appropriate cost levels are not decisive. Of relevance is rather the basic concept that presumptions of illegal or legal price setting follow from the fact that a certain threshold is met.

2.   Assessment of Market Structure

According to the case law, under-cost pricing alone does not constitute predatory pricing. The additional prerequisites differ depending on the jurisdiction. In Europe, the firm pricing below cost must have dominance (a). In the United States, the firm's ability to recoup the losses from under-cost pricing must be demonstrated (b). Both concepts essentially relate to an assessment of the market structure.

a)   Dominance Test

Art. 102 TFEU applies to dominant firms. Unilateral conduct such as predatory pricing can be a matter of European competition law only if the firm enjoys a significant level of market power. In contrast, Sec. 2 Sherman Act could be applicable to non-dominant firms that attempt to acquire monopoly power by employing predatory strategies.[20] In most cases this fine distinction will not matter

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[15]   Joskow/Klevorick, *A Framework for Analyzing Predatory Pricing Policy*, (1979) 89 Yale L.J. 213 (252) at fn. 79.

[16]   See e.g. Bolton/Brodley/Riordan, op. cit., (2000) 88 Geo. L.J. 2239 (2271).

[17]   US Supreme Court, *Brooke Group*, op. cit., at fn. 1.

[18]   ECJ, Case C-209/10, *Post Danmark*, judgement of 27 March 2012, para. 31-37.

[19]   EU Commission, *Guidance on the Commission's Enforcement Priorities in Applying Article 82 of the EC Treaty to Abusive Exclusionary Conduct by Dominant Undertakings*, [2009] OJ C-45/7, para. 26.

[20]   Sec. 2 Sherman Act can also concern the *maintenance* of monopoly power that is defined as "the power to control prices or exclude competition" which may be inferred from very high market

since it is unlikely that a firm that does not enjoy a significant degree of market power in the first place will be able to successfully predate over other firms.[21] However, European Union law potentially confines itself to a static analysis of market power. Although it is not regarded as a sufficient determinant for dominance, European legal practice relies heavily on market shares in assessing market power.[22] Therefore, it is conceivable that a firm with a high share of the pre-predation market will be held liable for predatory pricing once it cuts its prices below one of the cost thresholds, although the market structure might not enable foreclosure because the firm's market position is in fact contestable.[23]

Predatory pricing is by definition a dynamic concept.[24] The predating firm uses its pricing strategy to raise the barriers for competition. It can be said that the firm has not enough market power in the beginning, and it is just its behaviour, which increases its market power to the extent necessary to charge supra-competitive prices. Dominance can basically be defined as the ability to behave to a high degree independently from other market players. If a firm enjoys a stable form of dominance that is not contestable, it does not need to engage in predation. It rather can directly charge supra-competitive prices. Predation makes sense just in those cases in which a firm's market power is vulnerable. Therefore, it is much more relevant for predation cases to analyse the firm's ability to raise its market power than to look at the state of the market before predatory conduct was initiated. This ability largely depends on the level of market entry barriers that exist in the market before and after the predation phase.[25] Although the market analysis under EU law normally involves an assessment of market entry barriers, it is not automatically ensured that the dynamic concept is part of the two-folded presumption test. According to the case law, it is sufficient for finding predatory pricing to establish dominance and, in a second

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shares, cf. US Supreme Court, *United States v. Grinnell Corp.*, (1966) 384 U.S. 563 (571).

[21] EU Commission, DG Competition Discussion Paper on the Application of Article 82 of the Treaty to Exclusionary Abuses, December 2005, para. 97 states that normally only dominant firms can successfully engage in predatory pricing.

[22] EU Commission, Guidance, op.cit., [2009] OJ C-45/7, para. 13-15; see also GA Mengozzi, Opinion in Case C-209/10, *Post Danmark*, at para. 92, inferring market entry barriers from 'super-dominance' which exists in case of market shares of 90%.

[23] As to contestability cf. Bravo/Siciliani, *Exclusionary Pricing and Consumers Harm: The European Commission's Practice in the DSL Market*, (2007) 3 J. Comp. L. & Econ. 243 (251, 255).

[24] Besanko/Doraszelski/Kryukov, *The Economics of Predation: What Drives Pricing When There is Learning-By-Doing?*, Disucssion Paper, November 2011, available at ssrn.com/abstract=1976050, p. 6.

[25] Cf. Niels/Jenkins/Kavanagh, *Economics for Competition Lawyers*, 2011, p. 204-205.

separate step, under-cost pricing. What is missing in the European approach is the causal link between the conduct of under-cost pricing and the foreclosure effect in the recoupment market. It does not show that the conduct only has been done for the foreclosure effects and therefore cannot be competition on the merits.

It has indeed been observed that having significant structural market power is not a necessary requirement for applying predation strategies.[26] Rather, a certain level of monopoly power may be achieved by predation. Once the predating firm has increased its market power to monopoly power, it will be able to recoup its predation losses by charging supra-competitive prices and decreasing output to the detriment of consumer and overall welfare. Some authors focus on the extreme case that a firm engaging in predatory pricing acquires a monopoly or defends its existing monopoly.[27] From those extremes it can however not be concluded that a firm having less or no significant market power in the beginning could not successfully engage in a predation strategy. Other authors do not refer to dominance, but rather to the fact that a firm is already established in the market. They distinguish incumbents from entrants.[28] From that literature, it seems not to be necessary that the incumbent is dominant in the relevant market. An established firm might find it profitable to deter entrance into the market by pricing below cost and signalling to potential entrants that they would never be able to recover their costs.[29] Likewise, it could try to drive financially weaker rivals out of the market. It could raise prices and profits afterwards. Short-term losses would be made up by long-term gains under weaker competition. This strategy is seen as the only plausible rationale for an incumbent's below-cost pricing of established products. It is however not clear that this argument requires that the incumbent has dominance in the meaning of Art. 102 TFEU. It is just the case that dominant firms are likely to lack the justifications of smaller firms to have prices below cost.[30] Thus it can be assumed that predatory pricing by dominant firms is anti-competitive, whilst the same strategy performed by entrants

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[26] Niblett/Gans/King, *Structural and Behavioural Market Power under the Trade Practices Act: An Application to Predatory Pricing*, (2004) 32 ABLR 83 (100) with further references.

[27] Areeda/Turner, op. cit., (1975) 88 Harvard L. Rev. 697; cf. literature review in McGee, *Predatory Pricing Revisited*, (1980) 23 J.L. & Econ. 289.

[28] E.g. Baumol, op. cit., (1996) 39 J. L. & Econ. 49.

[29] This paper focuses on pricing, but other forms of predation are conceivable, e.g. increasing capacity beyond demand, see US v Aluminium Co. of America (Alcoa)148 F.2d 416 (2nd Cir. 1945).

[30] Unless the incumbent firm introduces a new product, which makes it an "entrant".

would normally be justified.[31] For example, small firms regularly need to gain scale before they can cover their average costs at the given market price. Dominant firms are by definition incumbents, and thus normally will already have reached the required output that should cover cost under a competitive price.

A static analysis of market power appears to be even more problematic when considering that the predatory firm does not need to gain dominance in the predation market. In reality companies are mostly multi-product firms, which might be able to predate on one product for which they do not enjoy market power to gain supra-competitive profits on another related product for which they have market power. Such a form of predation could be associated with tying or bundling strategies. A firm could use its strength from one market to predate in another market, and leverage its market power from the first onto the second market. A dominance test only being concerned with the static market power of the predation market might not detect this strategy. On the other hand, some market situations can make predation less likely although a firm enjoys dominance. For example, a monopolist of durable goods might find it harder to charge supra-competitive prices.[32] If additionally high switching costs are involved, price-cutting may not work at all to attract customers away from competing firms.[33] These considerations make it questionable to what extent the market power test has a purpose on its own when it relates to the firm's position in the market before predatory conduct was pursued. Which degree of market power existed before the predatory conduct, should from economic point of view not matter for the question whether the conduct is anti-competitive.

b)   Recoupment Test

The US Supreme Court considers it an essential element of predation that the predator can recoup its losses. It has been made clear that price-setting can be condemned as being predatory only if recoupment can be proven.[34] The recoupment test is therefore a substantial part of anti-trust litigation in predation cases and the burden of proof lies with the plaintiff. Without recoupment, the effect of below-cost

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[31] Motta, *Competition Policy*, 2004, p. 444, also pointing out the rare possibility of a non-dominant predator.

[32] Coase, *Durability and Monopoly* (1972) 15 Journal of Law and Economics 143. However, monopolists might achieve similar results by tying the durable with complementary goods, cf. Carlton/Perloff, *Modern Industrial Organization*, 4th ed., 2005, p. 333.

[33] This has been observed for software, see Yu, *Software Predatory Pricing and Competition Law - Assessing Below-Cost Prices*, [2012] E.C.L.R. 413 (421).

[34] US Supreme Court, *Brooke Group*, op. cit., at p. 224.

pricing would, according to the court, only enhance consumer welfare: "Although unsuccessful predatory pricing may encourage some inefficient substitution toward the product being sold at less than its cost, unsuccessful predation is in general a boon to consumers. That below-cost pricing may impose painful losses on its target is of no moment to the antitrust laws if competition is not injured".[35] The ability to recoup requires first that the below-cost pricing likely produces foreclosure effects, such as the exit of rivals or disciplining rivals to raise prices.[36] Second, the predatory scheme must likely inhibit competition in the relevant market. As the Supreme Court observed, "[i]n order to recoup their losses, [predators] must obtain enough market power to set higher than competitive prices, and then must sustain those prices long enough to earn in excess profits what they earlier gave up in below-cost prices."[37] Consequently, the recoupment test establishes a connection between the conduct causing foreclosure and an increase of market power.[38] It requires the analysis of the predation scheme and the market structure.[39] This involves a dynamic perspective as to how the predatory conduct may enhance the market power of the predating firm.

EU law follows a different way of thinking. The European Court of Justice continues to state that dominant firms have a "special responsibility" not to allow their behaviour to distort competition.[40] From an economic point of view, this special responsibility doctrine is unfortunate. There is nothing in economic literature to suggest that market dominant firms should not behave in the same way as non-dominant firms because they had an obligation to watch out for the state of competition. Rather, dominant firms should compete fiercely as well, even against smaller companies. At the most, it can be said that dominant firms might be more likely to have the ability to recoup their predation losses as both market power and recoupment are mainly based on the existence of market barriers. By having already said that the predating firm has market power, e.g. because of market entry barriers, the likelihood of recoupment increases to a point where it can be assumed, absent of contrary evidence. In context, it may be argued that the European courts follow this reasoning, albeit using the special responsibility wording.

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[35] Ibid., p. 224.
[36] Ibid., p. 225.
[37] Ibid., p. 225, quoting US Supreme Court, *Matsushita Elec. Industrial Co. v. Zenith Radio Corp.*, 475 U.S. 574 (1986), at p. 590-591.
[38] Vickers, *Abuse of Market Power*, (2005) 115 The Economic Journal F244 (F247).
[39] Ibid., p. 226.
[40] ECJ, Case C-209/10, *Post Danmark*, Judgement of 27 March 2012, para. 23.

Applying the special responsibility doctrine, the European Court of Justice does not require proof that recoupment of the losses is in fact possible.[41] This difference to US law may appear to make it easier for competition authorities in Europe to demonstrate predatory pricing. It should be born in mind though that Art. 102 TFEU requires the proof of dominance, and that this dominance test should regularly include an assessment of the structure of the market and its barriers.

Likewise, the US recoupment test essentially entails an assessment of the dispersion of market shares and market entry and expansion barriers. According to the Supreme Court, the recoupment test would fail "where the market is highly diffuse and competitive, or where new entry is easy, or the defendant lacks adequate excess capacity to absorb the market shares of his rivals and cannot quickly create or purchase new capacity."[42] In sum, the test required by US law is similar to the market power analysis required by EU law.[43] However latter does not make the dynamic analysis as clear since it does not primarily focus on the connection between the conduct and the increase in market power. As said above, there is a potential that legal practice relies on high market shares alone and concludes predation although the market structure would for example allow for unhindered entry of rivals.

Because of its inherent dynamic perspective, the expression of market structure assessments in the US recoupment test is preferable over the potentially more static dominance test of the EU.[44] However, it is argued here that also the recoupment test is not without fault. As seen, it builds a relationship between the under-cost pricing and the increase in market power, i.e. the ability to charge higher prices in the recoupment market and hence the possibility to increase profit. This relationship can also be true for legitimate business conduct. From an ex-ante perspective, any rational behaviour should in the end be expected to increase profit. It is hardly conceivable that a firm would engage in a conduct about which it already knows from the outset that it will bring losses in profit compared to other viable strategies. The only difference of legitimate business strategies compared to

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[41] ECJ, Case C-202/07, *France Télécom v Commission* [2009] ECR I-2369, para. 110-113.

[42] Ibid., p. 226.

[43] Cf. Bolton/Brodley/Riordan, *Predatory Pricing: Response to Critique and Further Elaboration*, (2001) 89 Geo. L.J. 2495 (2502), arguing that following US case law single firm predation would typically involve a dominant firm.

[44] Cf. Elhauge, *Defining Better Monopolization Standards*, (2003) 56 Stan. L. Rev. 253 (331-332). See also Bravo/Siciliani, *Exclusionary Pricing and Consumers Harm: The European Commission's Practice in the DSL Market*, (2007) 3(2) J. Comp. L & Econ. 243 (254-255).

predation would be, under the recoupment test, that the firm could never charge supra-competitive prices. As nearly every market involves some degree of market entry barriers and accordingly market power, prices above the level of workable or effective competition are in most cases possible and desirable.[45] The validity of the recoupment test is thus dependent on the price level that is regarded as competitive. As this is not further defined, the recoupment test entails the same risk of wrong decisions as the EU dominance test.[46] Since the outcome of the US recoupment test relies on the structural assessment of the market, it will as such not add much to the EU dominance test.

A further shortcoming of the recoupment test might be seen in the following effect: the higher the market entry barriers are, the more likely recoupment becomes, while the predation strategy as a whole becomes in fact less plausible. The stronger the market position of a firm, the less incentive for predation remains. A near monopoly would have to incur relative high losses to drive out residual competition (unless it can selectively target the customers of the competing firms) while the gain is limited. It can be more profitable to accept some competition and not to invest into the remaining market shares, especially if the residual competition is restricted in expansion. In result, for a plausible predation strategy, the market structure must be such that the predating firm's market power is contestable enough to provide an incentive to predate, and simultaneously the market entry barriers are high enough to let the strategy appear to be profitable. In case of very high market entry barriers, below-cost pricing will much more likely have a pro-competitive explanation compared to a situation with lower market entry barriers.

As a result, what is still missing in the recoupment test is the causal connection between the conduct and the foreclosure effect. The conduct should only be perceived illegal if the rationale for the below-cost pricing is to foreclose the market. The recoupment test does not provide evidence for this connection. In effect, it might not place much significance on the outcome of a case whether it is dealt with

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[45] It is not entirely clear which level of competitiveness the US Supreme Court has in mind. Perfect competition would be less meaningful though than workable competition, cf. in general Baumol, *Regulation Misled by Misread Theory*, 2005, p. 1-2. For a model on maximization of consumer welfare at above marginal cost pricing of intermediate goods see Evans/Quigley/Zhang*, Optimal Price Regulation in a Growth Model with Monopolistic Suppliers of Intermediate Goods* (2003) 36 Canadian Journal of Economics 2, 463.

[46] See the instructive dissenting opinion of Stevens J. in *Brooke Group*, op. cit., 509 U.S. 209 (255) on the issue whether the prices after the alleged predation phase were supra-competitive.

under the US or the EU approach, especially if the EU dominance test has regard to market entry barriers for the recoupment market.

3.   Justifications and Efficiency Defence

Once the initial test has established anti-competitive conduct by a firm, both the US and the EU law allow the firm to defend its conduct as being justified. According to the European Court of Justice, a firm that under the presumption test is in principle liable for a breach of Art. 102 TFEU can defend itself by demonstrating that its conduct was either objectively necessary, or that efficiencies exist which counterbalance any likely negative effects on competition and benefit consumers.[47] Likewise, the US courts allow a firm against which a prima facie case under Sec. 2 Sherman Act has been established to proffer a pro-competitive justification for its conduct, i.e. "a nonpretextual claim that its conduct is indeed a form of competition on the merits because it involves, for example, greater efficiency or enhanced consumer appeal".[48] This defence is based on the so-called rule of reason that was developed by the Supreme Court in the early monopoly case *Standard Oil*.[49] According to the Court not every form of monopolization but only unreasonable conduct violates the Sherman Act. The later case law and ultimately the *Microsoft*[50] decision clarify that the rule of reason provides a defence in the form of a pro-competitive justification for a conduct that initially is regarded anti-competitive.[51]

The justification and efficiencies defence serve as a safeguard against false positives where in fact the conduct is welfare-enhancing.[52] However, the burden of proof lies with the firm, and it must demonstrate that the positive effects at least balance out the foreclosure effects. It is hence not sufficient to show that there are any welfare enhancing effects. Rather, the sum of foreclosure and welfare-enhancing effects must be zero or positive. This is a difficult if not impossible proof as any doubt to that equation is stacked against the defendant. Once the two-fold test of under-cost pricing and market structure assessment finds predation, the justification

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[47] ECJ, Case C-209/10, *Post Danmark*, para. 40-42.
[48] *United States v. Microsoft Corp.*, 253 F.3d 34 (D.C. Cir. 2001) at 58-59.
[49] *Standard Oil Co. v. United States*, 221 U.S. 1, 62 (1911).
[50] *United States v. Microsoft Corp*, op. cit.
[51] Grimm, *General Standards for Exclusionary Conduct*. Working Paper 2008, available at https://www.ftc.gov/system/files/documents/public_events/section-2-sherman-act-hearings-single-firm-conduct-related-competition/section2generalstandards.pdf.
[52] Cf. Bolton/Bordley/Riordan, op. cit., (2000) 88 Geo. L.J. 2239 (2274).

and efficiencies defence can act as a corrective only in very obvious or extreme cases.[53]

In regard to the principle of legitimate expectations this burden of proof rule is not optimal. The firm can certainly best see which positive effects for itself may arise from its conduct. However, the firm cannot necessarily foresee the foreclosure effects its conduct entails unless it particularly seeks to predate competitors.[54] From an ex-ante view it will be hard to judge the market-wide effects of a firm's price setting even if the goal is to enhance the firm's own efficiency. It would be preferable to allow for a defence if the firm can show that it could reasonably expect significant positive effects from the conduct that were not dependent on the foreclosure of competitors. Whether those positive effects outweigh possible foreclosure effects should not matter for the legality of the conduct. The effects-based counterfactual test proposed further below will take this view into account.

In conclusion, the cost-related thresholds based on the Areeda-Turner rule provide relatively clear guidelines for firms. They enhance certainty about which conduct might be anti-competitive and hence could increase compliance with competition law.[55] However, in practice they are accompanied by structural market assessments, which make the case less clear. Both dominance and recoupment ability are hard to appraise and do not come with clear measurements. The justification rules weaken the cost-based tests even further. In effect, the cost-based rules can only serve as a filter for clear-cut scenarios. Predation cases will however often be ambiguous, and their outcome will not be easy to predict regardless of the cost-based rules.

III. The Counterfactual Test

In contrast to the EU and US courts, the courts in Australia and in New Zealand do not apply a presumption test, but rather a counterfactual analysis aimed at establishing a causal connection between the firm's market power and its conduct. Instead of assuming that a certain conduct of a firm having or acquiring dominance is anti-competitive, the courts require substantiation that the conduct would not have

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[53] Usually, efficiency effects will be hard to measure as this involves predictions under a high degree of uncertainty. If the antitrust proceedings take a long time, it might be possible to show that there have been efficiency effects in the past. However, since predation cases entail a long forward looking perspective, any efficiencies will likely show after that long period only.
[54] And a firm should not be concerned about overall welfare effects.
[55] Baumol, op. cit., (1996) 39 J. Law & Econ. 49 (51).

been pursued as part of a legitimate business strategy. The elements of that counterfactual test resemble those of the presumption test. However, the overall concept slightly differs and, as the following section is going to show, might lead to different outcomes in individual cases. This section analyses the concept of the counterfactual test, and compares it to the approach in the US and the EU.

1. The Counterfactual Test in Australia

Sec. 46 (1) Competition and Consumer Act resembles the European statute as it prohibits firms with substantial market power from taking advantage of that power for anti-competitive purposes. Like European law, the condemnation of unilateral conduct requires the presence of a dominant firm. The interpretation of the legislation by the Australian courts is however different. A breach of Sec. 46 (1) is not already presumed if a dominant firm acts in a certain way, such as setting prices below cost. Rather, the element of "taking advantage" of market power is understood as requiring a causal connection between market power, conduct and anti-competitive purpose.[56] As the illustrative judgement in *Natwest* points out:

"If a corporation with substantial market power were to engage an arsonist to burn down its competitor's factory and thus deter or prevent its competitor from engaging in competitive activity, it would not thereby contravene sec. 46. There must be a causal connection between the conduct alleged and the market power pleaded such that it can be said that the conduct is a use of that power."[57]

According to the case law of the High Court of Australia, it can be shown that a firm with substantial market power takes advantage of that power by applying a counterfactual test: the conduct is anti-competitive if the firm had not engaged in that conduct under the presumption that it lacked market-power.[58] In other words, the counterfactual test asks how the firm would likely behave in a competitive market.[59] For establishing the causal link between market power and conduct, the High Court also allows for methods other than the counterfactual analysis. It found that direct observation of for example the purpose of the conduct can lead to the correct

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[56] High Court of Australia, *Melway Publishing Pty Ltd v Robert Hicks Pty Ltd* (2001) 205 CLR 1; 178 ALR 253; [2001] HCA 13, para. 44.
[57] *Natwest Australia Bank Ltd v Boral Gerrard Strapping Systems Pty Ltd* (1992) 111 ALR 631 (637).
[58] High Court of Australia, *Queensland Wire Industries Pty Ltd v Broken Hill Pty Co Ltd* (1989) 167 CLR 177 (192); 83 ALR 577.
[59] High Court of Australia, *Melway*, op. cit., [2001] HCA 13, para. 28.

conclusion.[60] The precise meaning of the purpose element in Sec. 46 appears however not to be settled yet.[61]

Similar to the situation in the US and the EU, exclusionary conduct under Sec. 46 can be justified for legitimate business reasons. It is not clear whether those reasons can be part of the considerations of the counterfactual analysis or rather could determine the purpose of the conduct.[62] As the conduct and its purpose are interlinked, that distinction seems in effect not to make a difference. If it is shown that the firm has a legitimate business reason for its conduct, it would not make use of its market power since a firm without dominance would have necessarily acted alike.

In regard to predatory pricing, the Australian legislator recently introduced subsections to Sec. 46 that specifically address under-cost pricing. According to Sec. 46 (1AAA), if a firm supplies to a price that is less than the relevant cost, it may contravene Sec. 46 (1) even if it cannot recoup the losses incurred. Further, Sec. 46 (1AA) prohibits firms with substantial shares of a market to engage in under-cost pricing for anti-competitive purposes. It seems from the wording of the new legislation that it applies regardless of whether the firms take advantage of market power.[63] The causal connection between market power and conduct, and the counterfactual test should not matter anymore. As it cannot be foreseen how this change in legislation will affect judicial decisions, the following analysis concentrates on the counterfactual as established by New Zealand case law, which to a large extent refers to the Australian counterfactual test.

2.   The Counterfactual Test in New Zealand

In New Zealand, anti-competitive unilateral conduct is prohibited by Sec. 36 Commerce Act. This legislation is similar to the Australian Sec. 46 Competition and Consumer Act, and its normative elements resemble those of the European Art. 102 TFEU. According to Sec. 36 (2) Commerce Act, "a person that has a substantial degree of power in a market must not take advantage of that power" for anti-

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[60] Ibid., para. 53.

[61] Quo, *Interpretation and application of the purpose test in s 46 of the Competition and Consumer Act 2010*, Part 1 (2011) 19 CCLJ 90.

[62] Cf. Brock, *Section 46 of the Trade Practices Act - Has the High Court made a U-Turn on "Taking Advantage"* (2005) 33 ABLR 327 (336).

[63] Quo, op. cit., (2011) 19 CCLJ 90.

competitive purposes. The anti-competitive purposes described in that legislation are basically the conceivable foreclosure effects, namely preventing entrance, forcing the exit, or deterring competitive conduct of other firms. As in the European Union, the prohibition of anti-competitive unilateral conduct relates to dominant firms. As in Australia, the firm must not take advantage of its market power, and hence, for a violation of Sec. 36, the conduct needs to express the utilization of market power.

The main difference between predation cases of New Zealand and those of Europe and the United States is the counterfactual test. Essentially, the counterfactual test asks whether the firm would have behaved in the same way if it did not have market power. In so doing it poses a hypothetical situation on the market. The assumed counterfactual situation will be such that the market does not have firms with market power, but rather is in a state of workable competition.

The Supreme Court applied the counterfactual test in the *0867* case[64] in which the incumbent telecom operator introduced a free-call number for dial-up internet services in order to avoid consumers using dial-up internet services over competitors' interconnected networks. By introducing the 0867 number, Telecom reduced termination charges it had previously to pay to other network operators, which in turn have been using those charges to subsidize the internet dial-up services, provided over their networks. Internet service providers that used the 0867 number to offer dial-up connections to Telecom's customers did not receive termination charges. As the free-call number was a high incentive for consumers to switch to 0867 services, the internet service operators were practically forced to offer those dial-up connections. As a result, the competing network operators were to lose the internet service operators for Telecom's customers and the termination charges. Telecom's conduct was strictly speaking not a case of predatory pricing as it did not involve losses, which had to be made good by later price increases or profits from other products. Rather it eliminated losses it had incurred on dial-up services. However, in that case the Supreme Court dealt the first time with the elements of anticompetitive conduct under Sec. 36, and confirmed explicitly the relevant decisions of the Privy Council that concerned predatory pricing. The findings of the court in regard to the counterfactual test can thus be applied to the discussion of predation cases.

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[64] NZ Supreme Court, SC 76/2009, *Telecom Corporation of New Zealand (0867)* [2011] 1 NZLR 577.

The Supreme Court held in *0867* that a certain behaviour of a firm enjoying market power is not sufficient for a unilateral breach of competition law. Rather, there must be a causal connection between the firm's market power and its conduct. The dominant position must have facilitated the behaviour. Otherwise, the market conduct would have to be seen as a regular behaviour of firms in a competitive environment:

"The essential point is that if the dominant firm would, as a matter of commercial judgement, have acted in the same way in a hypothetically competitive market, it cannot logically be said that its dominance has given it the advantage that is implied in the concepts of using or taking advantage of dominance or a substantial degree of market power. Conversely, if the dominant firm would not have acted in the same way in a hypothetically competitive market, it can logically be said that its dominance did give it the necessary advantage."[65]

In applying that counterfactual test, the Supreme Court equates the absence of dominance with workable competition:

"Anyone asserting a breach of s. 36 must establish there has been the necessary actual use (taking advantage) of market power. To do so it must be shown, on the balance of probabilities, that the firm in question would not have acted as it did in a workably competitive market; that is, if it had not been dominant."[66]

The court does not explain what exactly workable competition means. However, any concept of workable competition would comprise some sort of rivalry among firms that face real world imperfections of markets, such as poor information, uncertainty and irreversible investments.[67] For sufficient restraint on the market power of the firms to exist, workable competition must exclude significant market barriers. Therefore, the counterfactual test essentially asks whether restraints on competition such as market entry barriers give an advantage to the predating firm.

In *Carter Holt Harvey*, the Privy Council acknowledged that the counterfactual test is in stark contrast to European Union law.[68] The European Court

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[65] Ibid., para. 31.
[66] Ibid., para. 34.
[67] Evans/Hahn, *Regulating Dynamic Markets: Progress in Theory and Practice*, ISCR Working Paper, 2010, available at iscr.org.nz, p. 8; Sumpter, *New Zealand Competition Law and Policy*, 2010, p. 6.
[68] Privy Council, Carter Holt, op. cit., para. 63-65.

of Justice has held consistently that a dominant firm has a "special responsibility" for the market, and therefore is not always allowed to behave as a non-dominant firm might (see above). The question whether or not a dominant firm would behave the same way if it was not dominant is of no relevance for the European courts. How the counterfactual test relates to US law has not been elaborated to a deep extent, but reference was made to the recoupment test.[69]

According to New Zealand's established case law, one cannot simply conclude from the purpose of the conduct (to eliminate competition) that this is already a use of market power.[70] As said, it has to be shown that the market power gave an advantage to the firm, facilitating its conduct. The purpose is not connected to the market position and hence does not give any information about the firm's ability to behave identically without having market power. This is also different from EU law and from some US decisions, which allow for concluding anti-competitive behaviour for prices above variable cost and below total cost if intent to exclude competition can be demonstrated.

Under the counterfactual test, setting prices below cost alone is no proof of the use of market power because also non-dominant firms may engage in such behaviour and competition over price is essentially the aim of competition law. From the case law it is also clear that the burden of proof is on the plaintiff or for that matter the Commerce Commission which has to show that the counterfactual test is fulfilled, i.e. that the dominant firm would not behave the same way without market power.[71]

3.   The Counterfactual as Recoupment Test

In reaction to the *0867* case, some commentators expressed disappointment with the Supreme Court's confirmation of the counterfactual test as established by the Privy Council.[72] The counterfactual test is regarded as being too difficult to apply.[73] It is criticized for requiring an unrealistic design of a theoretical market with

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[69] Ibid., para. 55.
[70] Ibid., para. 57, quoting Australian case law.
[71] Cf. NZ Supreme Court, *0867*, op. cit., para. 49: "the Commission failed to show".
[72] Scott, *Taking The Wrong Turn? The Supreme Court and Section 36 of the Commerce Act* (2011) 17 NZBLQ 260 (282).
[73] Ahdar, *The Unfulfilled Promise of New Zealand's Monopolisation Law: Sources, Symptoms and Solutions* (2009) 16 CCLJ 91.

hypothetical firms.[74] It is said further that the test ignores the fact that the conduct of dominant firms may have a different effect on markets than the conduct of non-dominant firms, and therefore the conduct of a firm without dominance cannot be a valid standard for comparison.[75]

However, the counterfactual test could, in respect to predation cases, just be interpreted as a means to ascertain the firm's ability to recoup losses. In other words, the counterfactual test required by New Zealand's case law could be said to be in effect not more than the recoupment test of the US. The counterfactual is a hypothesis, which aims at identifying whether there is a particular advantage stemming from the market power. If significant market power is missing and the market is governed by workable competition, then recoupment would not be likely. In other words, the ability to recoup predation losses due to market entry barriers is essentially the distinctive advantage that the firm with market power can utilize. In *Carter Holt Harvey*, the Privy Council also pointed into the direction that the counterfactual test in predation cases is identical to the recoupment test:

"There must (...) be a causal connection between the dominant position and the conduct which is alleged to have breached section 36. That will not be so unless the conduct has given the dominant firm some advantage that it would not have had in the absence of its dominance. It is the ability to recoup losses because its price-cutting has removed competition and allows it to charge supra-competitive prices that harm consumers. Treating recoupment as a fundamental element in determining a claim of predatory pricing provides a simple means of applying the section without affecting the object of protecting consumer interests (...)"[76]

If the counterfactual test in predation cases is essentially identical to the recoupment test, the question remains why New Zealand's courts would demand it, as market power and hence the ability to recoup should already have been proven. Similar to Art. 102 TFEU, Sec. 36 Commerce Act requires a dominant firm, and

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[74] Sumpter, *New Zealand Competition Law and Policy*, 2010, p. 254; see also dissenting judgement of Foscote and Richmond in *Carter Holt*, op. cit., para. 81.

[75] Sumpter, *Competition Law*, 2012 NZ L. Rev. 113 (124-125); Cross/Richards/Stucke/Waller, *Use of Dominance, Unlawful Conduct and Causation under Section 36 of New Zealand's Commerce Act 1986: A United States Perspective*, (2012) 18 NZBLQ 333 (339).

[76] Privy Council, *Carter Holt Harvey Building Products Group Ltd v Commerce Commission* [2004] UKPC 37, para. 67.

dominance depends on the existence of significant market barriers.[77] The counterfactual test would, under this interpretation, not more than double the exercise of investigating for barriers to enter or exit the market, or to expand output respectively. However, it is conceivable that the courts in the relevant cases just were not convinced that the market dominance test has already shown substantial market barriers allowing for later recoupment. Market power is a matter of degree, and there might be a dominant firm in the meaning of the applicable legislation that is still not strong enough to have the ability to recoup predation losses. As shown above, that possibility was identified as one of the problems with the European approach that relies on dominance alone and does not necessarily take dynamic aspects into account, which might result from changes in market entry barriers during the predation phase.

The case *Carter Holt Harvey* demonstrates this dynamic view on the relation of dominance and market entry barriers. The incumbent firm Carter Holt held a de facto monopoly for certain building insulation materials before competitors entered the market. Before the Privy Council, the appellant did not challenge the finding of dominance.[78] The Privy Council could hence not discuss whether the market position of Carter Holt in the supply of insulation products was stable in the long run or subject to potential competition as market entry barriers were low. Therefore, the only chance to discuss market entry barriers was the counterfactual test.

Seeing the counterfactual test in this context, it could be defended as a practice to double-check whether the prior dominance test has already demonstrated the existence of substantial market entry barriers in the long run. Courts have been criticized for posing a static view on competition law cases and only having regard to the market conditions in the time the predatory conduct has been performed.[79] In so doing, they might exclude many cases of predation that by definition rely on a dynamic progress over time. The counterfactual test could be seen as addressing this concern. The Privy Council's quote above seems to confirm this, as it made clear that the ability to recoup losses should be caused by the behaviour that reduced competition ("because its price-cutting has removed competition"). The

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[77] Cf. Mathewson/Quigley, *Market Power Thresholds: Theory and Competition Cases Related to Barriers to Entry, Oligopoly and Joint Dominance* in: Berry/Evans (eds.) *Competition Law at the Turn of the Century*, 2003, p.102 (110-113).
[78] Privy Council, *Carter Holt*, op. cit., para. 23.
[79] Cf. Bolton/Brodley/Riordan, op. cit., (2000) 88 Geo. L.J. 2239 (2242).

counterfactual thus addresses the causal connection between the conduct and lessened competition (or increased market power) in the recoupment phase, and not only the market situation before or during the predation phase. Its benefit is that it adds a dynamic perspective to the analysis of the firm's conduct.

However, the observations on the recoupment test made above also apply to the counterfactual test. It still can lead to false positives when the firm increases its market power by increasing its efficiency. Desirable investments could be captured by this rule if they increase market entry barriers. As said, all investments have in common that they are done in expectation of gaining an advantage in competition (or in other words gaining market power) that more than recoups the investment. Because of limited case law in that regard, it is unclear how courts would deal with an efficiency defence in those situations in which foreclosure is an effect of efficiency enhancing measures of the dominant firm.[80]

To conclude, the counterfactual test can be interpreted in a way that it essentially tests for market entry barriers for the recoupment phase. It differs from the European approach that regards the recoupment ability as being implied by the dominance of the firm. In practice it shifts the burden of proof for recoupment abilities onto the government. From an economic point of view, it does make little difference to the US approach. What is missing in the application of Sec. 36 Commerce Act is a causal link between the conduct and the foreclosure effects.

IV.   The Effects-Based Approach as Counterfactual Analysis

Recent discussion in Europe questions the established AKZO concept to predatory pricing. In the view of the European Commission and some observers, the logic developed by the European Court of Justice is too restrictive and might exclude some predation strategies by dominant firms. A more effects-based approach is suggested instead of the strict below-cost test. As will be shown, this effects-based approach implies counterfactual elements, which differ from the counterfactual test of the New Zealand Supreme Court.

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[80]   It could be argued that the *0867* case involved such an efficiency enhancing measure. Telecom tried to overcome a large adverse balance in the levels of terminating charges, as any other operator would have under competition, see NZ Supreme Court, *0867*, op. cit., para. 41.

1.   Counterfactual on Effect

The European Commission recently published its Guidance[81] on the application of Art. 102 TFEU to exclusionary conduct. It follows a new approach to unilateral conduct cases and focuses on the effect of exclusionary practices. In order to determine whether the effect of a conduct was anti-competitive leading to consumer harm, it proposes a counterfactual test:

"*This assessment will usually be made by comparing the actual or likely future situation in the relevant market (with the dominant undertaking's conduct in place) with an appropriate counterfactual, such as the simple absence of the conduct in question or with another realistic alternative scenario, having regard to established business practices.*"[82]

Similar counterfactual analysis is already applied in merger control in which probable future market scenarios with and without the proposed merger are compared.[83] Likewise, the European Commission intends to make use of the counterfactual method to determine negative effects of anti-competitive practices for the calculation of damages.[84] In relation to exclusionary conduct, such a counterfactual test will answer whether a potentially anti-competitive behaviour might actually cause a foreclosure effect.

How the effects-based analysis of unilateral conduct is built on the counterfactual test in merger control is explained in a paper that comes from the Chief Competition Economist's team of the European Commission. It is observed that merger control "evaluates the potential impact of the merger (...) by comparing the expected outcome with the merger with an unobserved counterfactual (the world if the merger did not proceed)."[85] A similar concept should be applied to cases of unilateral conduct. The question would be whether competition is hindered as result of the conduct compared to the counterfactual:

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[81]   European Commission, *Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings* [2009] OJ C-45/7.
[82]   Ibid., para 21.
[83]   Geradin/Girgenson, *The Counterfactual Method in EU Competition Law: The Cornerstone of the Effects-Based Approach* (2011), op. cit., p. 3-6.
[84]   European Commission, *Draft Guidance Paper - Quantifying Harm in Actions for Damages Based on Breaches of Article 101 or 102 of the Treaty* (June 2011).
[85]   Papandropoulos, *Implementing an effects-based approach under Article 82*, Concurrences 1-2008, 1 (3).

"... the test for assessing the anticompetitive effects would aim at comparing the exercise of market power with the practice (...) with the exercise of market power without the practice. In this context, a practice would only be condemned if foreclosure of rivals is likely to result and if rival foreclosure is expected to lead to consumer harm (relative to the counterfactual). In other words, a practice would only be condemned if the exercise of market power it entails leads to anti-competitive foreclosure (as opposed to foreclosure alone)."[86]

The counterfactual test on effect differs from the New Zealand case law, as it is not referring to the market power, but rather to the outcome. In the end, however, this counterfactual test adds little to the initial question whether a certain conduct harms competition (or finally consumers). This was identified as being a difficult exercise since one potentially foreclosing conduct can be both anti-competitive and pro-competitive. Or in other words: the counterfactual here establishes just a causal link between the conduct and harmful effects that potentially may arise.[87] However, it does not answer whether the harmful effects are the basis for the conduct, and the conduct would not have been done but for the harm on competition. The basic idea, however, to test the conduct with a counterfactual analysis on effect is a thought worthwhile to follow, and might provide a useful tool for predatory pricing cases.

2. Counterfactual in Relation to Predatory Pricing

In respect to predatory pricing, the Guidance still remains within the established AKZO logic, however tries to open its interpretation into a more flexible, effects-based direction. The European Commission does not express the counterfactual test explicitly. However, it is implied by the wording of its guidance paper that such a mechanic might be applied. The Commission at first follows the AKZO logic, adapted by more "modern" cost standards, and presumes predation when average avoidable cost (AAC) is not covered, and normally excludes predation when Long Run Incremental Costs (LRAIC) are covered. If prices are in the range between AAC and LRAIC, and evidence consisting of documents showing a predatory strategy is not available, it may apply a profitability test:

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[86] Ibid., p. 3.
[87] The analysis would also consider "procompetitive motivations for the practice and efficiencies brought about by the practice", ibid. p. 3.

"*In order to show a predatory strategy, the Commission may also investigate whether the allegedly predatory conduct led in the short term to net revenues lower than could have been expected from a reasonable alternative conduct, that is to say, whether the dominant undertaking incurred a loss that it could have avoided. (...) Only economically rational and practicable alternatives will be considered which (...) can realistically be expected to be more profitable.*"

As has been observed, this test for alternative conduct can be framed as a counterfactual analysis.[88] The counterfactual would be a scenario that corresponds to a situation without predation. The test could compare the net present value for the incumbent and for the rival in the two situations (alleged predation and alternative behaviour). This would allow computation of the impact of losses incurred by the predatory behaviour and to establish a causal link between the loss or profit sacrifice and foreclosure of competitors. The short-run sacrifice must have an impact on the market by potentially excluding competition in the long run. Regardless of the pricing level, the main criterion is the effect of the conduct on the market's profitability. The question is whether there is a difference in the profitability of a rival that is as efficient as the predator if the predator incurs losses in profit due to measures such as low pricing.

While the counterfactual test of the New Zealand Supreme Court relates to the market power of the firm, this test of effect is based on the behaviour of the firm. The first test asks: would the firm behave the same way if it has no market power? The second test asks: would the profitability of the market be the same if the firm behaved differently?

The problem with this profitability test is that it widens the applicability of the predation test in general and might well include false positives. Any investment made by a firm will reduce its short-term profit. It does not matter whether this investment comes in the form of increased capacity, innovation, advertisements, promotional offers, and alike. All those short-term profit sacrifices are done in the expectation that they ultimately lead to higher profits in the long run. Those investments can be both legitimate business behaviour and predation. The impact on competitors will also be similar. If the investment strategy is successful, the market

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88 Mateus, *European Competition Journal* 2011, 243 (255-256).

share of the firm, its profits and ultimately its market power will increase, and those of the competitors will be lessened in comparison to alternative market conduct. Moreover, the profitability test allows for several counterfactuals. In some cases, the predation strategy can be the most profitable: lowering prices for a short time in order to signal the willingness to predate could incur fewer losses than for example investing in enhanced quality of the products.

3.   Proposed Counterfactual Formula

A counterfactual test on effect can have its merits for the task to distinguish anti-competitive from pro-competitive conduct. It could solve some of the problems identified for the EU dominance based per-se rule, the recoupment test of the US, and the counterfactual test as applied by the New Zealand practice. What was missing in these tests is a causal link between the foreclosure effect and the conduct.

A conduct should be perceived to be anti-competitive if it had not been done but for the foreclosure of competition. If the foreclosure is the main motivation, or the primary profitability factor for a firm's strategy, the firm should not be allowed to implement its strategy.[89] If foreclosure is, in contrast, just a side effect, which will harm less efficient rivals, but not consumer welfare in the long run, the strategy should be regarded as competition on the merits. Thus, there should be a test that determines whether the foreclosure effect is the incentive for the firms' conduct.[90]

The counterfactual test proposed here would ask: would the conduct be done if the foreclosure effects did not exist?[91] That is the converse formulation to the effects-based approach of the EU Commission that asks whether the foreclosure effect exists if the conduct had not been done. The latter effects-based test could however include accidental foreclosure effects, which do not affect the overall profitability of the conduct, such as investments in more efficient technology, or in new markets. As the firm can best foresee its own profits, but hardly the total effect on competition, the proposed counterfactual test could give guidance for the firm's decision on its strategy. If the strategy only can increase profits in the case

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[89]   Presumed that the firm has such a market position that its conduct effectively can foreclose competition.

[90]   Such a test would in effect resemble the "no economic sense test" discussed in the US, see Werden, *Identifying Exclusionary Conduct Under Section 2*, (2006) 73 Antitrust L.J. 413.

[91]   The factual is not the conduct, but the market structure that enables foreclosure effects. See the description of a profit-sacrifice test in Niels/Jenkins/Kavanagh, op. cit., p. 185.

competition is excluded it is clearly anti-competitive. That rule would be in line with the definition of predation by Ordover and Willig, pursuant to which a practice is predatory if it would not be profitable but for its foreclosure effect.[92] If the firm's incentive for the strategy is effectively to increase efficiency, to enter new markets, or to extend the customer base, then it is pro-competitive, regardless of whether competition is lessened as one effect. The rule differs from the justification defence under EU law and the US rule of reason as the burden of proof is not with the defendant, but the pro-competitiveness is part of the initial assessment of the firm's conduct. The proposed counterfactual test would be similar to the test of the Supreme Court of New Zealand. However, it would not relate to the market power of the firm before the predation, but rather to the increased market power and associated foreclosure effects after the predation phase.

In regard to predatory pricing strategies, the identification of foreclosure effects could still adhere to the Areeda-Turner/AKZO-logic. The existence of foreclosure effects could be presumed if prices are below a certain cost threshold. Further, the likelihood of foreclosure effects can be said to increase as the market power of the firm increases. Foreclosure effects can be more likely under certain market structures than under others. Also the ability to recoup losses will determine the profitability of the pricing strategy. However, the proposed counterfactual test would demand as a further element a causal link between the possible foreclosure effects and the firm's incentive. The test would exclude pro-competitive activities such as advertisement campaigns, promotional offers, or investments in new technology as they are profitable regardless of the foreclosure of rivals. On the other hand, it would allow for including strategies that are based on the firm's reputation for predation, and similar strategic behaviour.

V.   Conclusion

So far, none of the applied methods on testing for foreclosure have actually solved the dilemma of predatory pricing. Lowering of prices can be both, pro-

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[92] Ordover/Willig, *An Economic Definition of Predation: Pricing and Product Innovation* (1981) 91 Yale L.J. 8 (9). See also Carbal/Riordan, *The Learning Curve, Market Dominance, and Predatory Pricing*, (1994) 62 Econometrica 1115 (1126); Snider, *Predatory Incentives and Predation Policy: The American Airlines Case*, http://www.econ.ucla.edu/people/papers/Snider/Snider508.pdf, 2009, p. 5. Cf. further Besanko et. al., op. cit., p. 5, suggesting a distinction between advantage-building (related to competition for efficiency on a learning curve) and advantage-denying (related to predatory pricing) motives.

competitive and anti-competitive. The per-se rule of the European Union is built on the presumption that below-cost pricing of dominant firms are likely to have anti-competitive effects. The rule has been criticized for being too static and not to take strategic behaviour into account. Similarly, the more dynamic recoupment test as applied by the US courts fails to see that any conduct of firms can be expected to have a positive outcome on the firm's profits. As recoupment of losses will be the aim of any firm, it only excludes irrational or unsuccessful behaviour of dominant firms. The recoupment test lacks a causal connection of the foreclosure effects and the conduct. The tests of both the EU and the US allow for efficiency defences. However, the firm has to prove that the positive effects of its conduct more than outweigh the negative effects on the whole market. It is not enough to show that effects enhancing the firm's efficiency are the rationale for the conduct. The counterfactual test as established by the Australian and New Zealand courts merely looks at a link between the market power and the conduct. In regard to predatory pricing, this counterfactual does in effect not provide more insight then the recoupment test. Finally, the recently pursued effects-based approach of the European Commission entails counterfactual elements, which seem to be more promising. However, in the end it does only addresses issues similar to the recoupment test. It asks whether a conduct would possibly enhance the dominant firm's profit and lower rivals' profits. It does not establish whether the conduct is only been done because of the foreclosure effects.

A counterfactual analysis may have its merits for separating anti-competitive from pro-competitive pricing. It could establish the missing causal link between foreclosure effects and the incentive for the conduct. The question is whether the conduct had not been done but for the foreclosure effects. If the conduct is only profitable with foreclosure effects in place it should be hold anti-competitive. This would be distinct from other suggested profitability tests that ask whether a conduct is more or less profitable compared to other strategies, but do not provide a causal connection between profitability and foreclosure.

Due to the ambivalence of price-cutting, predatory pricing makes a good case to discuss the analysis of exclusionary practices. However, it is conceivable that such a form of counterfactual test could also be useful for other forms of exclusionary conduct, such as price discrimination, refusal to supply, or tying and bundling.

Chapter 2 – Not Safe for Work

The Effect of No-Fault Workers' Compensation on Occupational Accident Rates

Abstract

In countries with workers' compensation schemes, employees receive compensation for injuries at work regardless of fault, while civil law liability of employers is either limited or fully excluded. Compensation schemes provide several instruments to partially restore employers' accountability for safety, such as experience rating, and to induce employees to take care, such as reduced benefit pay-outs. The degree of liability matters for workplace safety, and different legal arrangements influence incentives of employers and employees to take care. In theory, both no-fault compensation and strict liability insurance can make use of the same instruments to mitigate moral hazard. Risk classes, experience rating and reduced benefits are found in many countries. In addition, the option to self-insure potentially reduces overall accident rates. In practice however, private insurance of strict liability seems to be better suited to adapt insurance levies to risks of individual firms. An empirical analysis of several jurisdictions reveals a consistent pattern. The combination of arrangements that increase civil liability and mitigate moral hazard seems to be important for safety at work. The analysis indicates that no-fault workers' compensation with the benefit of effective compensation comes with a cost: more injuries of those, which it seeks to protect.

1   Introduction

Workers' compensation schemes determine the liability for accidents at workplaces in the majority of industrial countries. Employees receive compensation for injuries at work regardless of fault of either party in the work relationship. Civil law liability of employers is either limited or fully excluded. By and large, employees cannot invoke contractual and tort law against employers for damages from personal injuries. The responsibility of employers is mainly limited to the contributions to the compensation scheme.

Although such compensation schemes were widely introduced in the 19th century, their effects on safety at workplaces have hardly been studied (Schwartz, 1994, p. 392; McEwin, 2000; Morantz, 2010, p. 197). The following analysis shows that the degree of liability matters for workplace safety, and different legal arrangements influence incentives of employers and employees to take care. Compensation schemes provide several instruments to partially restore employers' accountability for safety, such as experience rating, and to induce employees to take care, such as reduced benefit pay-outs. The particular extent and the combination of these instruments likely have an effect on safety and occupational accident rates. The bundle of civil law access, benefit levels, experience rating, and self-insurance matters for the safety outcome. As the elements of liability complement each other, they have to be assessed together.

The findings of this paper support the hypothesis that there is indeed a link between the degree of liability and workplace safety. Lower employers' liability results in higher accident rates. The analysis starts with an overview of workers' compensation arrangements in various countries providing examples for the differing arrangements. Having identified the degree of liability of employers in those countries, an analytical framework for the liability in workplace relationships is developed. The impact of compensation arrangements on incentives of employers and employees is analysed, having particular regard to insurance effects and moral hazard. Next, research on safety effects of compensation arrangements is reviewed, and finally complemented by a descriptive statistical analysis of the safety outcomes in the exemplar countries.

2 Workers' Compensation Arrangements in Different Countries

The countries presented below provide examples of jurisdictions with different liability rules and features that can influence incentives to take care at the workplace. The countries can be grouped into three categories: The United Kingdom and the Netherlands have abandoned the traditional workers' compensation systems, and employers are fully liable for accidents. Most countries exclude or limit civil law liability of employers, and provide for a no-fault compensation scheme that adjusts the levies according to the individual risks. Examples for countries with restricted liability are Australia, Germany, the United States and Canada. Finally, in New Zealand individual liability of employers is almost fully excluded.[93]

2.1 United Kingdom

Although injured employees in the United Kingdom can claim benefits under the general social welfare system, tort law is much more relevant for workplace accidents (Lewis, 2012). Tort law offers full compensation and awards damages for both pecuniary and non-pecuniary losses. These damages are considerably higher than those of the tax-funded no-fault industrial scheme that does not provide compensation for financial losses such as lost earnings or cost of care.[94] Although tort in principle requires proof of fault, the courts in practice have shifted tort liability in workplace accident cases towards strict liability. For example, non-compliance with health and safety legislation will frequently be sufficient for liability. Vicarious liability of employers is accepted if fault of the fellow employee can be proved. Due to uncertainty and costs of court proceedings, insurers rarely contest fault. The majority of claims (about 98%) are settled out of court. Most employers are obliged to have liability insurance, which is provided by private insurance companies.[95] About half of the employers have a sufficient number of employees to be experience rated.[96] In addition, employers have to pay a weekly minimum allowance for sick or injured workers. The allowance is paid from day four to a maximum of 28 weeks of absence from work.

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[93] In very exceptional cases, punitive damages could be granted; and experience rating has only recently been introduced. See below.

[94] The disabled benefits under the industrial scheme are a form of pension and compensate in respect to the injury, regardless of earnings. Medical care is covered by the National Health Service.

[95] Only certain public authorities and government departments are exempt as well as family businesses unless incorporated as a limited company.

[96] There is no set number of employees, and insurances may also experience-rate small and medium sized businesses, once an individual accident record is established.

2.2   The Netherlands

In 1967, the Netherlands abolished workers' compensation in favour of a combination of civil liability and social welfare (Lindenbergh, 2012). The liability of employers for accidents at work is extensive. Although liability is based on the general fault principle, amendments of labour law in 1997 shifted the burden of proof explicitly to the employer. The Dutch courts interpret the obligation of employers to take care so broadly that it approaches strict liability. This broad interpretation is justified on the grounds that the employee financially depends on the employer and that the employer controls the work conditions.[97] Contributory negligence in theory limits employers' liability, but this defence is interpreted very narrowly, and the employer has to prove that the employee acted deliberately recklessly and was aware of the reckless character of the behaviour.[98] Liability insurance is voluntary for employers, and about 50% of the firms have such insurance. In addition to civil liability, labour legislation provides for an extensive duty to cover absence pay. Employers must pay at least 70% of the salary for the first 104 weeks of illness, regardless of the cause of incapacity.[99] Frequently, individual or collective agreements provide for up to 100% of the salary. In contrast, the benefits from social welfare are very limited, and play a minor role for the financial compensation of workers.[100]

2.3   Australia

In Australia, each state and territory has its own rules on workers' compensation; in addition, federal compensation schemes exist (Lunney, 2012). The factors that influence incentives to take care differ considerably among those jurisdictions. For example, some states exclude civil law liability of employers, while others only limit liability or modify the common law for actions of workers against employers. The extent and methods of experience rating differs too. All jurisdictions permit some firms to be self-insured, but the requirements for firms to apply for self-insurance vary.

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[97]   Dutch Supreme Court (Hoge Raad), 22 January 1999, LJN AD2996, NJ 1999, 534.
[98]   Dutch Supreme Court (Hoge Raad), 20 September 1996, LJN ZC2142, NJ 1997, 198.
[99]   Since 2004, Art. 7:629 Dutch Civil Code.
[100]   There are no reliable figures on the number of tort law claims filed; Philipsen (2007, pp. 169-171) provides an estimate.

Most Australian states allow common law actions of employees against employers. Personal injuries due to work accidents can thus result in liability of employers even if workers' compensation is available. In these states, employers need to hold insurance for their liability.[101] Common law liability can be limited as to both its scope and the amount of damages. For example, New South Wales limits damages to loss of past and future earning capacity, and does not allow for recovery of non-pecuniary loss or medical expenses.[102] Costs for medical care are excluded also in Victoria and in Queensland. Some jurisdictions limit the amount that can be awarded to successful plaintiffs. For instance, in Victoria non-pecuniary loss is only recoverable if assessed over a certain threshold amount, and a cap applies. In Western Australia total damages are capped for workers with a permanent impairment of less than 25%. In New South Wales and in Queensland damage awards are reduced by the amount of compensation benefits, effectively reducing the liability of employers. Further, liability for work accidents in Australia appears to be much more aligned with the general common law principle of negligence than for example in the United Kingdom where liability in employment relationships as a matter of case law approaches strict liability. For instance, Queensland stipulates circumstances for contributory negligence, such as when employees do not follow safety instructions of employers, or do not use safety equipment provided.[103]

Only the Northern Territory and South Australia exclude common law actions in employment relationships. In factual terms, the combined liability of employers still differs between these two jurisdictions. South Australia has a relatively high rate of self-insured employers affecting a large part of the workforce (Safe Work Australia, 2013a, p. 48). Since the no-fault principle applies to self-insured firms, self-insurance in effect amounts to strict liability for workplace injuries, albeit with reduced benefits compared to tort law. In contrast, the rate of self-insured employers in the Northern Territory is very low. The conditions for firms to be self-insured differ between the jurisdictions, but generally firms have to show sufficient financial

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[101] Western Australia introduced this requirement in 2011; Workers' Compensation and Injury Management Amendment Act 2011 (WA).
[102] Workers' Compensation Act 1987 (NSW) S. 151G.
[103] Workers' Compensation and Rehabilitation Act 2003 (Qld) s. 305H(1).

resources and adequate capitalization to meet their liabilities. Some states also require a bank guarantee and reinsurance cover.[104]

The situation is similarly diverse in respect to experience rating. While for example South Australia has just introduced a mandatory experience rating from 2012 onwards for medium and large enterprises (Safe Work Australia, 2013b, pp. 206, 218), Western Australia allows the accredited private insurers to surcharge up to 75% on the industry-wide recommended premiums, and unlimited discounts (Safe Work Australia, 2013b, pp. 205-6).[105] The publicly funded compensation schemes of New South Wales and Victoria apply experience rating based on past claim costs to medium sized and large firms only, and Queensland limits the effect of experience rating for small firms. The private insurers of the remaining states are generally more flexible in considering the claim history of employers.

Under federal law, employees are entitled for ten days paid sick leave in case of injuries or illness.[106] Unused sick days accumulate over the years of employment. In addition, most compensation schemes require employers to pay an excess for the first few days of absence due to injuries. The number of days and the amount of employers' excess differ from state to state. While the excess in South Australia, for example, consists of the compensation for the first two weeks of the period of incapacity per worker per calendar year, no such excess has to be paid in Western Australia (Safe Work Australia, 2013b, p. 42).

2.4   Germany

In Germany, workers' compensation is provided by several independent public-law occupational cooperatives (*Berufsgenossenschaften*) dedicated to specific economic activities (DGUV, 2013, p. 10). All employers have to contribute to the respective scheme on the basis of their annual wages (Waltermann, 2012). Premiums are set according to industry risk classes. The occupational cooperatives are obliged to consider individual employers' incidents of workplace injuries when calculating premiums. The cooperatives have a wide discretion in setting surcharges and discounts to the base premium, which can be up to 25%. In addition, employers have

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[104] E.g. Queensland, Workers' Compensation and Rehabilitation Act 2003 (Qld) s. 84 and s. 86.

[105] Further surcharges may be approved by the government agency for workers' compensation (Workcover WA).

[106] Fair Work Act 2009 (Cth), s. 95 and 96. Long-term disabled workers may receive support benefits by the federal social security system Centrelink.

to pay sick leave in the full amount of the wage for the first six weeks of incapacity to work.[107] The cooperatives fund injury benefits in the amount of 80% of the employee's gross income only after the end of sick leave payments.[108]

With respect to work accidents, employers are almost completely exempt from civil law liability for personal injuries of employees. The statutory exclusion of liability relates to all sorts of personal loss including pain and suffering. Employers might be sued for damages only in the case of intent. Similarly, social welfare institutions may only have a right of recourse if employers have acted with intent or gross negligence. In addition, liability of fellow employees is excluded which is defined widely and includes employees of other firms working in the same context (e.g. a construction site).

2.5   United States and Canada

Further examples for countries with similarly low liability of employers are the United States and Canada. Insurance for occupational risk is compulsory in most U.S. states. Only Texas and since recently Oklahoma allow employers to opt out of the workers' compensation program (Morantz, 2014, p. 3). In some states, private employers have the choice between private and public insurers, while in few others solely public mutual funds exist. Self-insurance is possible in most states. Civil liability of employers for work-related accidents is largely excluded.[109] In exchange, victims do not have to prove fault of their employers in order to receive compensation. Insurance premiums take the risk class of the employer's business activity and its salaries into account. Experience ratings are possible, and premiums can reflect the accident history of the business (Eurogip, 2011, pp. 5, 15-19).

The arrangements for workers' compensation in Canada are by and large identical to the public insurance systems in the U.S. The Workers' Compensation Boards or Commissions of the provinces and territories exclusively provide compulsory insurance for occupational accidents. Premiums are based on the risk level of the business concerned and an individual employer's assessment rate that may be increased or decreased according to past work injuries. The right to sue

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[107] This is the same for accidents and for illness.

[108] Sec. 45-47 German Social Security Code VII. Injury benefits are usually paid out by the public health insurances. After 78 weeks, a disability pension is paid with further reductions in benefits.

[109] In Texas, employers that opt out are fully liable under tort law.

employers for accidents at work is largely excluded, in exchange for no-fault compensation of workers.

2.6   New Zealand

New Zealand provides a comprehensive accident scheme that applies to personal injuries from all kinds of accidents, including work accidents. The Accident Compensation Corporation (ACC) is a government owned company (a Crown entity) and has the statutory monopoly for running the universal accident insurance (Evans and Quigley, 2003, p. 430). The accident compensation scheme is funded with taxes and levies. Both employers and employees have to contribute to the compensation scheme. Levies are taken from the earnings and businesses' payrolls. Only employers' levies contribute to the cover of injuries that occur at the workplace, whilst those of earners contribute to non-work injuries, except for motor vehicle accidents. Employer's levies are calculated according to their businesses' risk group. Experience rating was introduced only recently, in April 2011 (Todd, 2011, p. 197). It allows for up to 50% reduction or increase of the employer's levies based on the claims history.

Tort law claims relating to personal injuries in accidents are generally excluded, except for punitive damages that are potentially available in very rare occasions.[110] As a result, employers are practically fully exempt from common law liability. The accident compensation scheme provides for some limited incentives of employers to invest in safety (Clark et al., 2010, p. 12). Small employers in selected high-risk industries such as fisheries can receive a Workplace Safety Discount of 10% if they attend a safety management course and complete a self-assessment. Employers with a poor injury record can be subject to a Workplace Safety Evaluation that might result in levy increases of up to 50% for the year in which the audit takes place. Of further relevance is the ACC Partnership Programme that offers larger firms the opportunity to self-insure (Full Self Cover). The self-insurance is limited to a certain number of years and employers are required to obtain a stop loss cover with a cap in the range of 160% to 250% of the expected total claims costs (Lamm et al., 2012, p. 26).

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[110] NZ Accident Compensation Act 2001, s. 319. Supreme Court of New Zealand, 24 March 2010, *Couch v. Attorney-General*, [2010] NZSC 27. The injurer must have acted intentionally or with subjective recklessness.

Employers must cover at least five days of paid sick leave for illness and injuries after the first six month of employment and additional five days after each subsequent twelve months. Unused sick leave accumulates to a maximum of 20 days.[111] In case of work-related accidents, the employer has to pay the first week of accident compensation instead.[112] The accident compensation amounts to 80% of the usual wage, but employer and employee can agree to top up the first week of compensation to 100% by reducing the employee's sick leave entitlement by one day for each five days' leave taken. The ACC compensation steps in from the second week of leave relating to a work-related accident.

3 Analytical Framework of Liability in Workplace Relationships

Liability arrangements in workplace relationships affect the incentives of employers and employees to invest in safety. The incentives of injurers and victims are frequently discussed in the context of situations that are classical for tort law and do not involve contractual relationships between injurers and victims, such as car accidents. Workplace accidents are different from accidents between unrelated parties, and more comparable to accidents caused by faulty products (Shavell, 1987, p. 51 in fn. 6). However, they differ from product liability situations insofar as employers and employees are in an on-going relationship, are to some extent both harmed by workplace accidents, and both influence the safety level by their respective behaviours.[113]

3.1 Incentives of Employers

Under the assumption of fully informed rational decision making, the employer seeks to minimize total cost of accidents, and invests only to the point where marginal cost of accident avoidance equals the marginal benefit of reducing expected accident losses (Calabresi, 1968; Shavell, 1987, p. 34). The employer accepts some risk of accidents as it is more efficient to eventually bear damages than to spend further expenses for avoiding these accidents (Posner, 1975, p. 472).

Without insurance, the employer fully internalizes the cost of workplace accidents, no matter which liability regime exists (Shavell, 1987, pp. 52-53). Under

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[111] NZ Holidays Act 2003, s. 65.

[112] NZ Accident Compensation Act 2001, s. 98.

[113] Although products can be applied unsafely by consumers, they do not affect the safety of the product as such. In contrast, employees and employers together shape the safety of the work environment. While employers select employees, producers cannot normally choose consumers.

strict liability employers compensate employees for their actual accident costs (ex post compensation); under a regime with no liability, they would instead have to pay wage premiums (ex ante compensation). In both cases, the expected sum of accident cost remains identical as does the level of care.[114] Liability arrangements that do not fully compensate after an accident has happened make wage premiums necessary. This is the case under workers' compensation schemes, which limit compensation amounts. Also, often negligence does not provide full compensation if defences such as contributory negligence exist, or if it is difficult in practice to prove fault of injurers.

Due to insurance effects, both civil law liability and workers' compensation create moral hazard. Civil law liability comes with the option to privately insure. Workers' compensation schemes operate in effect as liability insurances for employers as well (Wagner, 2012a, p. 27). As with all insurances, the risk of accidents is pooled over many individuals, and firm-specific risks are externalised to a larger group. Liability insurances can be welfare enhancing for two reasons (Shavell 1987, p. 190; Baker and Siegelman, 2011). First, the expected utility of the risky activity increases for risk-averse subjects, as they prefer to incur expenses to lower risk while the risk-neutral insurer is indifferent about the risk. Second, the risk is distributed equally over a group of similar persons or firms so that they share the risk. As a result, the risk is lowered for every participating individual. These beneficial, welfare-enhancing effects are compromised by ex ante moral hazard:[115] insured firms lose incentives to take care in so far as the insurer cannot observe their behaviour. As the injured employee will be compensated by the insurance, the employer does not take potential compensation or wage premiums into account when investing in safety. Since the firm cannot increase its own utility by increasing safety for workers over the extent that it is itself harmed by an accident, it likely underinvests in safety. If insurers are unable to detect the level of care applied by the insured party, they cannot adapt the insurance premium accordingly. In such cases the level of care decreases and the risk of accidents increases, resulting in higher insurance premiums for every insured party. Higher insurance premiums in turn are

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[114] This assumes that employers are risk neutral; risk-averseness is discussed below in the context of employees' incentives.

[115] In addition, there is ex post moral hazard, i.e. increased incentives to report accidents. This, however, does not affect real accident numbers, and is therefore excluded in the following discussion.

unattractive for low-risk firms and only high-risk firms remain in the insurance, which increases the pooled risk. This adverse selection effect is hence increased by moral hazard.

Moral hazard problems of workplace liability insurance can be mitigated (Baker and Siegelman, 2011, p. 16-21). In general, insurances may only pay parts of the liability sum, and thereby preserve some incentive to apply care. Third party liability insurances, however, often cannot make use of deductibles. For example in the United Kingdom, deductibles are not permitted for employers' liability insurance in order to protect employees from insolvency of the policyholder (Parsons, 2003, fn. 29).[116] A further method to mitigate moral hazard is to adjust premiums to historic incidents. Firms with a relatively low number of accidents receive discounts, while firms with high numbers pay surcharges. A solution for adverse selection is compulsory insurance, which for example exists in the United Kingdom.

Compensation schemes mitigate the moral hazard problems in the same way. Commonly adopted are industry specific premium rates (Trebilcock, 1989, p. 26). Firms in riskier industries pay higher levies, reducing the firms' overall output and hence the level of risky activities. A further method is experience rating that sets firm-specific levies based on the past incidents of injuries in the firm, which increases the firm's total accident cost in accordance with the individual risk. Depending on its magnitude, experience rating reduces the moral hazard problem and increases the level of care (O'Connell and Linehan, 2005, p. 133). In addition, some compensation schemes, such as those of Australia, allow larger firms to self-insure, which eliminates the moral hazard effects for these firms. Adverse selection is minimized by making the contributions to the compensation scheme compulsory for most employers. The concept of self-insurance, however, means that some firms can avoid part-taking in the scheme. Most likely this is applicable to large firms with low risk profiles. Depending on the jurisdiction, further exemptions may exist for self-employed persons.

As a matter of fact, workers' compensation schemes mitigate moral hazard to a limited extent only. If experience rating is used, it often relates to some percentage of the levy, and small firms are excluded. In particular in Germany and New Zealand,

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[116] If the insurer paid only parts of the liability sum, the employer as policyholder would have to pay the rest.

the focus is on industry-specific rates, which however do not increase incentives to take care for individual firms, as the premium is to be paid independently of individual accident risks. Firms with a poor accident-record can spread their risk across the industry (Dewees et al., 1996, p. 380) and hence externalize accident cost to other firms.

3.2   Incentives of Employees

Employees also respond to incentives and adapt their behaviour at the workplace. Because employees perform the work, their level of care must affect the safety outcome (Guardado and Ziebarth, 2013; Oi, 1973; Chelius, 1974; 1982, p. 236). Employees decide to invest time and effort to exercise caution at work, or to take shortcuts and spare themselves the trouble to respect safety guidelines. The example of piece rates shows that incentives of employees matter for the safety at work. Workers on piece rates have a significantly greater likelihood of injury (Bender et al., 2010). They have an incentive to sacrifice quality and safety for speed.

Both strict liability and workers' compensation schemes have the effect of first-party insurance for employees. The arrangements practically insure the partial accountability of employees that would exist under a negligence regime. Under a fault-based system, employees could be able to insure themselves for their liability and transfer the risk to a risk-neutral insurer. To the degree employees are risk-averse such risk pooling is welfare-enhancing. If risk-averseness of all employees is assumed, compulsory contributions of all employees to a common insurance could be desirable because all employees would benefit and adverse selection would be avoided; in effect, this is achieved by workers' compensation schemes. Further, risk-averse employees prefer ex post compensation over ex ante wage premiums, since the former provides full compensation with certainty while the latter has an uncertain outcome.[117] Depending on the risk-averseness of the workforce, employers must pay higher wages to attract employees if full ex post compensation is not guaranteed, and insurance for the differential of compensation is not available.

By offering ex post compensation, strict liability and workers' compensation create moral hazard in the principal-agent-relationship between employer and

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[117] In case of an accident resulting in disability to work, wage premiums would only partially compensate the worker, depending on the number of wages the worker has already received before the accident. The majority of workers that never have a serious injury fare of course better with ex ante compensation. But this cannot be established in advance, and hence involves risk.

employee. The employer cannot control the workplace all the time, and the employees' level of care is unobservable to a very large extent (Wagner, 2012a, p. 22). As to minor accidents, employees could indeed be indifferent about injuries if these are fully compensated. In these cases, investment in safety does not create much benefit for employees and incentives to take care are reduced.

Due to the non-mutual effects of workplace accidents, however, by which employees are more likely to get hurt than employers, the impact of employees' moral hazard is much lower than that of employers. Employees have a large intrinsic incentive to behave safely (Wagner, 2012a, p. 23-24). They especially try to avoid serious injuries as no payment can truly compensate the loss of life or limb. Parts of the harm of injuries, like pain and suffering, cannot really be compensated. Incentives to take care increase the larger the risk of physical integrity is (Moore and Viscusi, 1990, p. 67). Therefore, financial incentives of employees should not have much impact on serious injuries. Employees might be more careless, however, with regard to less serious injuries that do not cause permanent disability or pain.

Civil law liability in the form of negligence would mitigate moral hazard of employees. The principal-agent-problem does not persist as a faulty employee would not receive full compensation. This is also true if the employee receives wage premiums. The employee will still have the incentive to avoid the loss even of minor accidents. Employees can maximise their salary by receiving the wage premiums without actualizing accident losses. From this perspective, wage premiums are preferable over ex post compensation as they keep the incentives of employees. In contrast, strict liability does not have mechanisms to mitigate moral hazard on the side of employees.[118]

Moral hazard can be mitigated with limitations of workers' compensation. Many compensation schemes provide for benefit pay-outs that are lower than full compensation. For example in most Australian states and in New Zealand, employees receive reduced income replacements in cases of long-term incapacities. In contrast to civil law liability, compensation for non-economic losses such as pain and suffering is generally not awarded (Parsons, 2002, p. 362). As financial incentives

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[118] Contributory or comparative negligence is a common law defence and would either deny or reduce compensation if the victim was negligently contributing to the harm. The effect of this defence depends on the jurisdiction, but under strict liability it could only be applied when victims knowingly and unreasonably subject themselves to a risk of harm.

play a small role for major injuries, partial compensation seems not to have substantial safety increasing effects. In respect to less severe accidents, however, employees could indeed have a higher incentive to take care. Further, assuming full information of workers, partial compensation must result in wage premiums to compensate for the higher risk. Employers thus internalize parts of the accident costs, and have an incentive to increase safety levels. Similar to a negligence regime, partial compensation of workers might reduce accident rates due to increased incentives of employers and employees, but only with limited effect.

Some caveats with partial compensation exist. First, it undermines the social rationale of workers' compensation to guarantee full compensation especially for those workers that depend on their salary. Second, higher wage cost due to necessary wage premiums for unavoidable risks may lower activity levels of firms, and thus reduce output. In complete markets, risk-averse workers would demand a risk premium on top of the wage differential if they cannot expect full ex post compensation. Third, reduced compensation diminishes safety incentives of employers that partake in the injury cost, especially experience rated and self-insured firms (Morantz, 2010, pp. 207-209). As a result, it might still be similarly effective and socially desirable to fully compensate major injuries and limit partial compensation to less severe injuries.

3.3 Additional Elements of Labour Law

Mitigation of moral hazard is diluted by several employment law provisions that are unrelated to workers' compensation. Most importantly, employers frequently are required by labour law to pay full salary for a certain number of days of employee's incapacity. As an extreme example, the Netherlands provide for a sick pay of up to 104 weeks.[119] For minor injuries such sick leave provisions effectively insure workers against the loss of income in case of an accident. In this way, continued-absence pay can be another source of moral hazard (Trebilcock, 1989, pp. 39-40). This effect is complemented by health insurance systems that cover the medical costs of accidents. Such coverage of accident costs functions as another level of no-fault insurance. Hence, reduced benefit pay-outs do not necessarily restore incentives in regard to minor accidents. The reduction of pay-outs for incapacities

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[119] As a result, employers have a strong incentive to prevent accidents (Engelhard, 2007, p. 58).

caused by accidents mainly affects employee's incentives to take care in respect to a medium range of severity of injuries. In that range, the employee is incapacitated long enough to not benefit from absence payments, but not to such a degree that life or limbs are threatened.

A frequent approach to counter moral hazard of compensation schemes is to increase occupational health and safety regulation (Fiore, 2009, p. 420). In this way, financial incentives and tort remedies are replaced by threat of punishment for non-compliant employers, sometimes involving criminal penalties. Regulation certainly has a large effect on workplace safety. However, it is only a partial substitute for the original incentives to lower accident cost and by way less efficient (Shavell, 2013). The incentives to adhere to regulation depend largely on the likelihood of detection, which requires a high degree of investment in inspection and enforcement. Only the most severe accidents are subject to regulatory or criminal investigation. In contrast, the incentives from civil law liability are largely independent of public observation. Tort actions reveal information about incidents from those directly affected. Whilst regulation suffers from information deficits, injured employees and their dependents have a personal incentive to bring a claim forward and to supply the relevant information. Furthermore, liability instantly refers to the best practice and current safety standards in an industry. Regulation depends on the insight of legislators and administration, and suffers from time lags probably resulting in non-optimal safety rules.

A further problem with regulation relates to accountability: health and safety inspectors cannot be held accountable for a health risk they do not know. Unless an inspection reveals a breach of regulation, an authority cannot be expected to take action.[120] In principle, an authority is not responsible for ensuring that workplaces are safe, but rather only that safety rules are observed. In contrast, tort law liability induces an employer to actively look for hazards in the workplace and to positively ensure that safety standards are met. Thus, a legal system that only relies on regulation supports ignorance about workplace risks.

Regulation is a complement to and not a substitute of civil law liability. It clearly overlaps with the deterrence effects of tort and contract law, but does not

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[120] There is moral hazard of governmental agents, too. The effectiveness of a safety officer's inspection work is not easily observable.

necessarily address the same safety issues. As can be seen in the example of tort law application to workplace accidents in the United Kingdom, non-compliance with occupational health and safety regulations induces civil law liability, but the reverse is not true (breach of regulation is sufficient, but not necessary for liability). Even if employers adhere fully to safety regulation, they may still be liable for damages due to negligence. As a result, only relying on regulation, and excluding tort actions, cannot be optimal (Shavell, 1984). Regulation exists in jurisdictions with civil law liability as much as it exists in pure no-fault countries, and adds to the incentives to take care.

3.4 Result

Neither workers' compensation nor strict liability is the superior arrangement as such. Their effectiveness rather depends on how moral hazard is mitigated. In theory, both arrangements have similar insurance effects that reduce incentives to take care, and can make use of the same instruments to mitigate moral hazard (Wagner, 2012b, p. 582). In practice, however, workers' compensation schemes rely on industry-wide premiums and only to a limited extent on experience rating. Reduced compensation pay-outs that are often applied by workers' compensation schemes restore incentives only to a limited extent. The prospect of receiving full compensation reduces employees' incentives with less impact than the increased incentives on the side of employers (Morantz, 2010, p. 208; Parsons, 2002, p. 375).

4 Review of Empirical Research

A crucial question is whether the validity of the analytical framework can be established empirically. Few studies analyse the factual effects of no-fault compensation compared to civil law liability. The following sections summarize studies that evaluate changes of institutional arrangements within a country, and differences in institutional arrangements between different jurisdictions.

4.1 Effects of Institutional Arrangements within Jurisdictions

An early study by Chelius (1976) assesses data on industrial accidents involving deaths caused by non-motor vehicle machinery accidents in the United States in the years 1900 to 1940. During this period many US states passed statutory modifications to the common law that either modified or completely abolished employer defences such as the fellow-servant rule, which excluded liability of

employers if an injury was caused by a negligent co-worker. In addition, employer's failure to comply with government safety rules became a basis for negligence. The states in the US started in 1911 to enact no-fault workers' compensation resulting in a system of shared strict liability. Chelius shows that both enhanced employer's liability and workers' compensation laws were associated with significantly lower death rates.

The changes in common law for work injuries in the United States were also analysed by Fishback (1987). Using pooled data for coal-mining fatal accident rates in the twenty-three leading coal states for the years 1903 to 1930, the study concludes – in contrast to Chelius (1976) – that the shift from common law negligence to increased employer liability or workers' compensation generally led to increases in fatal accident rates in the coal industry. The author explains this effect with moral hazard of employees that were not completely offset by increased safety efforts of employers. Dewees et al. (1996, p. 353) suggest that the cost of supervision varies for different industries, and that the abolition of the fellow-servant rule should have different effects depending on the industry.

Several empirical studies investigate the effect of increased benefits for injured workers on safety levels (Chelius, 1982; Moore and Viscusi, 1989; 1990, p. 133; Kaestner and Carroll, 1997). Although higher pay-outs may increase employees' moral hazard, they simultaneously increase incentives to invest in safety on the side of employers. The net effect remains unclear. All in all, higher benefit levels seem to matter less for moral hazard in respect to severe injuries (Moore and Viscusi, 1990, p. 67). This result agrees with the analytical framework, according to which employees have a large intrinsic incentive not to get hurt, independently from compensation. On the other hand, employers internalize the risk of reduced compensation with wage premiums (Viscusi, 1993; Viscusi and Aldy, 2002; Grund, 2001; Pouliakas and Theodossiou, 2013, p. 179), which would keep their investment incentives intact. That some studies nonetheless show positive safety effects of increased benefit levels, may be explained with incomplete information of employees about injury risks. The resulting wage premiums may not adequately compensate for the risk, and hence not induce safety investments by employers to the same extent as full ex post compensation.

Some studies analyse effects of changes in the calculation of premiums in workers' compensation schemes. Kötz and Schäfer (1993) estimate the effect of premium surcharges and discounts on accident rates in the German sugar industry. Starting in 1966, experience based surcharges were introduced, and in course of the following decade adapted to finally allow for individual rates of firms between 50% and 150% of the normal premium. The regression analysis shows that the surcharges and rebates led to a considerable and statistically highly significant reduction in the number of accidents. The authors exclude that the reduction in accidents could be attributed to a change in the reporting practices of the firms.

Similarly, studies for the United States find that experience rating significantly reduces accident rates. In an analysis of data for the years 1972 to 1979, Ruser (1985) establishes that larger firms have lower injury rates because they are more frequently experience-rated. The importance of experience rating is confirmed by more recent assessments. Analysing claim rates of individual firms in Wisconsin for the year 2003, Barth et al. (2008) find that experience rating in workers' compensation motivates employers to improve safety and lower the number of claims. The authors observe an ex-post pricing effect, meaning that increases in rates lead to decreases in claims in subsequent years. However, the study does not answer whether the reduction in claims results from safety efforts or other measures, such as suppression of claims. A study based on survey data of Canadian firms finds that experience rating in workers' compensation insurance affects a broad spectrum of firm behaviours (Kralj, 1994). In response to experience rating, employers actually alter their safety practices and invest in accident prevention, but also allocate significant resources to claim cost control, for example by providing short term modified work for injured workers at full pay, rather than have them seek benefits from the workers' compensation scheme. In a draft study, Neuhauser et al. (2013) analyse data on those firms in California that became experience rated over the course of some years, and find that these firms had a significant decline in compensation losses relative to those whose status did not change. The decline of losses was due to a reduction of claim frequencies, whilst the average claim cost did not change. The authors argue that experience rating results in real safety improvements as the suppression of claims would primarily target minor claims and therefore increase the average claim cost of a firm.

Taken together, the empirical evidence supports the finding that experience rating is a decisive element to provide incentives to take care. According to simulation models by Victor (1982), fully experience rated premiums of larger self-rated firms provide even higher incentives than self-insurance (as to the safety-increasing effects of self-insurance see Asfaw and Pana-Cryan, 2009). For smaller firms, however, experience rating is often either not applied or has only a limited effect relative to the payroll (Clayton, 2002, pp. 22-23).

4.2   Effects of Institutional Arrangements across Jurisdictions

Shin et al. (2011) empirically investigate how various workers' compensation insurance systems in different countries affect occupational injuries and diseases. They analyse data of 23 OECD countries for the years 1990 to 2008. The authors control for common aggregate variables across countries, such as income levels, industrial structures, and population characteristics. The applied fixed effect model further captures unobserved country-specific differences that might among others stem from differences in the reporting of incidents.

The main result of the study is that variations of compensation systems indeed affect injury and disease rates. Private insurance systems are associated with lower rates than public insurance systems. The authors explain this effect with higher efficiencies and the cost-reduction rationale for private insurances. Probably more surprising is the result that an insurance system that bases premiums on individual risks is positively correlated with higher rates of fatal injuries and diseases compared to a fixed, flat-rate funding mechanism. This result seems to contradict the moral-hazard theory and the evidences on the effects of experience rating. Finally, the study finds that the degree of compensation is negatively and significantly correlated with occupational injuries. The authors conclude that a "worker comfort effect" due to higher anticipated compensation is stronger than the moral hazard effect of employees to decrease safety efforts. This result does not contradict the framework of incentives to take care according to which the financial incentives of workers do not matter as much for serious injuries. Further, the financial burden of employers and compensation insurances increases with higher compensation levels, and the overall incentives to avoid injuries and to reduce claims increase.

Several issues with the design of the study might be responsible for the result that risk-based premiums cause higher rates of occupational injuries. The authors highlight a possible problem with the fixed effect model in case that assumed fixed factors are actually varying during the observation period. The methods for calculating premiums are likely to have changed in some countries during the 19-year period. In addition, some countries have several rating mechanisms in place, as for example Australia with its state specific compensation schemes. The primary problem might be a causality issue. It could just be that countries with higher incidence rates introduced experience rating, causing a correlation between high incidence rates and risk-based premiums. Also the variables used do not reflect the extent and degree of experience rating within a country.

Moreover, the study does not clearly distinguish fatal accidents and diseases. The status of diseases as work-related is frequently challenged by employers and compensation schemes alike. A possibly long time lag between the cause and the first signs of the disease might also distort incentives to avoid work-related diseases. Accidents are often treated differently from diseases as some countries impose private liability for accidents, but provide social cover for diseases. In sum, it is difficult to see which elements of risk-based ratings influence the surprising result of the regression analysis.

5   Empirical Assessment

Comparing the accident rates of different jurisdictions can indicate whether the analytical framework predicts well, and the institutional arrangements for employers' liability indeed might have an effect on workplace safety. In the following, data from comparisons of workplace safety levels of different countries are interpreted discussing possible effects of the legal systems on injury rates. In addition, data for work related fatalities in Australia are used for an intra-country analysis of the diverging institutional arrangements in the Australian states.

5.1   Global Trends of Occupational Accidents

Hämäläinen et al. (2009) estimate global trends of occupational accidents with data from the years 1998, 2001, and 2003. For the fatal accident figures, the authors use data from ILO Laborsta as well as from Eurostat for European countries. Laborsta covers only wage earners while Eurostat includes self-employed persons

and farmers. The figures from Eurostat are adapted using a ratio, which the authors derive from a comparison of ILO and Eurostat data of selected European countries. Because non-fatal accidents tend to be heavily under-reported, the authors calculate non-fatal accidents using lower and upper limit estimates, which they derive from the proportion of fatalities to the reported accidents causing four days of absence in two sets of European countries.[121] The mean value of the upper and lower limit for each country is the basis for the final non-fatal accident rates.

The authors report a global trend of decreasing fatality rates in most regions whilst accident rates in total have increased slightly. This trend can also be seen within the countries whose schemes have been described above (Table 1).

Table 1   Occupational accident and fatality rates (per 100,000 employees) of selected countries for the years 2001 and 2003

Country	Fatality Rate 2001	Fatality Rate 2003	Accident Rate 2001	Accident Rate 2003
United Kingdom	0.8	0.8	639	757
Netherlands	1.5	1.3	1,125	1,232
Australia	2.6	2.0	1,978	1,849
Germany	3.0	2.5	2,295	2,342
USA	4.9	5.0	3,753	4,681
New Zealand	4.3	5.3	3,252	4,943
Canada	6.9	7.6	5,238	7,112

Source: Hämäläinen et al., (2009). Non-fatal accidents are estimated.

The figures of the study provide only a tentative indication for the comparison of the effects of liability arrangements in selected countries. Specifically, the rate for non-fatal injuries is subject to inconsistencies. The estimated figures for non-fatal accidents in Germany and the United Kingdom are significantly lower than the officially reported data of Eurostat. The numbers of fatal and non-fatal accidents for Canada are multiple times higher than the rates found in the ILO Laborsta database, which indicates gross overestimation for some countries. Further, some countries do not report accidents on the way to and from work as work-related (for example the United Kingdom).

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[121] The lower limit was derived from all EU-15 states as of 2003, but Portugal; the upper limit countries are Finland, France, Germany, and Luxembourg.

The differences of accident rates also have to be seen in the context of the industrial composition of the countries. Some industries have much higher risks of accidents than others. Especially, agriculture, construction, transport, and manufacturing are prone to high accident rates (Pouliakas and Theodossiou, 2013, p. 173). Countries with a higher proportion of these industries have higher accident rates, ceteris paribus.

Given those reservations, definite conclusions about the effects of liability arrangements cannot be drawn. It can be noted, however, that the only countries in the sample with full applicability of tort law, the United Kingdom and the Netherlands, have the lowest rates for both fatalities and accidents. Australia having a mix of jurisdictions with full, limited, and excluded applicability of tort law is also on the lower end. In contrast, countries with a lower degree of liability have higher incidence rates.

5.2   International Comparison of Occupational Fatal Injury Rates

Lilley et al. (2013) compare fatal injury rates at workplaces in selected countries using data from 2005 to 2008. The purpose of this study was to report on New Zealand's performance in occupational safety compared to other countries. The study analyses data for nine countries: Australia, Canada, Finland, France, New Zealand, Norway, Spain, Sweden, and the United Kingdom. The data were obtained from the ILO Laborsta online database. The countries for comparison with New Zealand were selected because they were members of OECD prior to 2000, their data had comparable industry classifications, and the data published by ILO were available for at least two consecutive years in the four-year period under consideration.[122] The data are adjusted to account for differences of the reported ILO data in scope and methodology, such as differences in industry composition, or differing industry classifications. The authors also adjust the data for the United Kingdom in respect to road traffic accidents related to work as those are not included in the United Kingdom, but in all other countries relevant to the study.

The study mentions further differences which can have an effect on the outcome of the comparison, but which could not be appropriately adjusted due to

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[122] Why the data for the other countries of consideration here, i.e. the US, Germany, and the Netherlands, were not available, is not completely comprehensible. A recent ILO database request produced estimates for these countries under the requirements of the study.

lack of data, such as the inclusion of fatalities from occupational diseases in some countries, incomplete coverage of the working population, inclusion of self-employed persons, and differences in firm size composition. Because of those limitations, the authors warn that their results are potentially misleading. The study concludes from the available data that New Zealand has the highest occupational fatality rate out of the nine market economies compared. Table 2 extracts the results for those countries that have been presented above.

Table 2   Occupational fatal injury rates (per 100,000 person years) averaged over the period 2005-2008 (UK: 2005-2006)

Country	Non-standardised Incidence Rate	Industry Standardised Incidence Rate
United Kingdom	1.3	2.1
Australia	2.1	2.7
Canada	2.7	3.0
New Zealand	4.2	4.2

Source: Lilley et al. (2013), pp. 25-26. Other countries' rates lie in between UK and NZ.

In this sample, it can be seen that the two countries with some degree of tort law liability, the United Kingdom and Australia, have significantly lower fatality rates than New Zealand where tort law is excluded. Canada that also excludes tort law is comparable to Australia, which indicates that other factors than tort law, such as experience rating, play a role for safety outcomes. Some of New Zealand's inferior performance might be attributed to the lack of experience rating until 2011. In conjunction with the global trends study above, these results conform to the observation that liability in workplace relationships might matter for safety. The data provide further confidence in this finding, given that some of the reservations against the comparability of the data have been accounted for (especially the consideration of work-related traffic accidents in the United Kingdom). Because of the small number of countries and the general reservations for cross-country comparisons, the observed tendencies can only indicate that a link between accident rates and liability may exist.

5.3   Intra-country Analysis for Australia

As the states of Australia have varying arrangements for the liability of employers, they provide a case for a descriptive intra-country analysis, which avoids some problems that frequently exist with cross-country comparisons. Heterogeneity

is reduced as the collection of data is fairly standardised within Australia, and socio-economic and unobservable cultural differences can be assumed to be smaller than across countries. Reporting issues are minimized by concentrating on work-related fatalities. These provide a good proxy for overall accident rates with which they are highly correlated.

The incidents of fatalities were supplied by Safe Work Australia for the years 2003 to 2012, including the industry and state where the accident has happened. Fatality rates per 100,000 full time equivalents (FTE) for each industry are calculated using separate employment figures from the Australian Bureau of Statistics that provide the hours worked in each industry over the ten year period. The relatively long period reduces year-by-year variation and is statistically more meaningful than snapshot views of one or two years. Since the Australian states possess divergent industry structures, standardised fatality rates were calculated. According to the direct standardisation methodology, the industry-specific rates of each jurisdiction are weighted by the number of work hours in the equivalent industry group of all Australia. The standardised rate is the sum of all weighted fatality rates over all industries for each jurisdiction divided by the total Australian number of work hours.

In contrast to the studies above, traffic accidents on public roads are excluded. Traffic accidents are less influenced by the incentives of workers' compensation schemes, but far more by independent factors such as population density and the liability regimes concerning traffic accidents. Some jurisdictions cover journeys from and to work while others do not. Excluding traffic accidents reduces this comparability problem.

As can be observed from the figures in Table 3, the industry type matters for the performance of a jurisdiction. The most hazardous industries are agriculture, mining, transport and warehousing, and construction. Especially the agricultural sector shows large variations between jurisdictions. This can be explained with the composition of this sector that includes farming, forestry, and fisheries, which have different accident risks.

Table 3   Non-Traffic Related Fatal Incidence Rates (Deaths per 100 000 FTE), Australia, 2003-2012

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
Accommodation and Food Services		0.72		0.56	1.12	2.13	0.32	0.27	0.59
Administrative and Support Services	2.86	2.95		4.45	1.82		1.78	4.50	2.96
Agriculture, Forestry and Fishing	52.92	17.02	78.90	20.15	11.93	33.71	14.04	14.49	17.49
Arts and Recreation Services	3.94	4.04	5.39	4.98	2.89	3.95	0.65	6.56	3.47
Construction	7.21	4.66	9.84	5.94	4.93	7.03	3.84	3.46	4.77
Education and Training	0.89	0.06		0.78	0.77		0.38	0.37	0.39
Electricity, Gas, Water and Waste Services		2.97	8.01	2.04	4.30		3.27	5.37	3.18
Financial and Insurance Services		0.08	7.64	0.25				1.49	0.21
Health Care and Social Assistance		0.28		0.07	0.18	1.28	0.12	0.30	0.21
Information Media and Telecommunications		0.93			2.11		0.22		0.56
Manufacturing		2.47	3.42	2.41	2.11	3.36	1.87	3.98	2.40
Mining		2.42	7.22	5.69	15.78	12.80	9.60	5.50	5.96
Other Services		0.69	5.57	0.97	1.41		1.25	0.29	0.92
Professional, Scientific and Technical Services		0.39	4.96	0.91		1.40	0.40	0.35	0.50
Public Administration and Safety		1.37	0.84	1.91	0.60	1.76	1.59	1.11	1.31
Rental, Hiring and Real Estate Services		2.09		1.90		4.66	1.03	2.53	1.74
Retail Trade		0.84		0.46	0.19		0.30	0.41	0.50
Transport, Postal and Warehousing		4.48	14.80	4.74	6.19	11.19	4.27	7.66	5.11
Wholesale Trade		1.45	5.09	1.81	1.43	1.81	0.83	0.65	1.28
All Industries	**0.91**	**2.15**	**6.01**	**2.98**	**2.46**	**5.02**	**1.80**	**2.86**	**2.41**

Sources: Own calculation from fatal incidence data provided by Safe Work Australia and employment figures available from the Australian Bureau of Statistics.

Table 4 presents the standardised fatality rates for the Australian states as well as indicators for the degree of liability that have been sourced from reports by Safe Work Australia (SWA). Common law liability denotes the expected amount in thousands that an employee may receive as compensation from the employer for a permanent impairment caused by a workplace injury in an exemplary scenario (SWA, 2013a, pp. 24-25). These figures are estimates of payments under common law settlements in addition to the statutory benefits of the workers' compensation schemes. The benefit level represents estimated entitlements of injured workers that can be expected for long-term disabilities. Since incentives of employers and employees may depend on benefit pay-outs for long-term disabilities, the average percentage of pre-injury earnings for middle income earners with 104 weeks of impairment is used (SWA, 2013a, p. 23). Self-insurance coverage refers to the percentage of employees who work in self-insured firms (SWA, 2013b, p. 156).

Table 4   Non-Traffic Related Fatal Incidence Rates (Deaths per 100 000 FTE), Australia, 2003-2012, and Liability Factors as of 2012

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Non-standardised fatality rate	0.91	2.15	6.01	2.98	2.46	5.02	1.80	2.86
Standardised Fatality rate	3.05	2.32	6.85	2.76	2.36	3.97	2.00	2.54
Common law liability	3,000	1,153	0	1,393	0	421	1,688	1,038
Self-insurance coverage	1%	24%	3.7%	9%	37.78%*	4.67%	6.1%	9.3%
Benefit level medium income	74%	61%	83%	78%	84%	93%	82%	87%

Sources: Data sheet provided by Safe Work Australia; SWA, Comparative Performance Monitoring Report, 15th ed., 2013. Standardised fatality rates are the total of all industry specific rates weighted by the employment figures in the industry group of the equivalent standard population (all Australia).
* Self-insurance rate for SA from SWA, Comparative Performance Monitoring Report, 14th ed., 2012.

Some states rank distinctively better than others. Victoria has in sum the lowest injury rates, followed by New South Wales, South Australia, Western Australia, and Queensland. The worst performers in this sample are the Australian Capital Territory and the Northern Territory, which can be attributed to their small

population size and specific industry structures.[123] The values are likely not representative and not used for the discussion of the safety effects of liability.

No single liability feature seems to be responsible for work-place safety. Although Victoria has the lowest fatality rate and a high common law liability, South Australia without access to tort law does not perform much worse. This can be explained with the high degree of self-insurance combined with the high benefit level. In total, South Australia's employers should have a low degree of moral hazard. Also, the effect of common law liability is limited, as employers take out liability insurance. The benefit level as such seems not to correlate with safety. New South Wales has a fatality rate similar to South Australia, and similar self-insurance coverage, but a much lower benefit level. The reduced benefit level seems to counteract the common law access that is medium high.

These trends coincide with the framework for safety incentives. The combination of the factors has been identified as being important for safety incentives. Employers' liability is related to the three factors of common law, self-insurance, and benefit levels. The higher the three factors are in combination, the lower is the fatality rate in the Australian sample. The benefit level does not seem to lower employees incentives to take care, as higher levels are not associated with higher rates. According to the analytical framework, this can be expected as employees have a large intrinsic motivation to avoid serious injuries and financial incentives do not matter for severe accidents. Especially self-insured employers have an incentive to increase safety if benefit levels are higher (see above 3.2).

As a result, higher pay-outs to employees in form of the compensation schemes' benefits and damages from common law actions seem to correlate with lower accident rates. This would indicate that safety incentives of employers in practice do not follow the predictions of the analytical framework as found in the literature. Under the assumption of complete markets, employers would, by means of ex ante wage differentials, internalize the cost of accidents that are not paid ex post by the compensation scheme. As a consequence, the level of safety investments should be higher with lower ex post compensation, as the total cost of accidents

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[123] The accident-prone mining industry is strong in NT. Accident-prone industries are underrepresented in ACT. Industry standardisation even over a ten year period cannot fully account for the large variances from the relative small sample sizes.

increases for the individual employer. Higher safety investments under higher benefit levels, in contrast, show that employment markets are incomplete and inappropriate wage differentials are paid.

Some issues still exist with the data for the descriptive comparison, which may distort the findings. In the data set, self-employed workers are not accounted for, and it would be preferable to separately calculate rates for the type of employment. Further, the fatalities were counted for the states where they happened, but not where the employer is based, which determines the applicable compensation insurance mechanisms. This fact could be more relevant for some industries such as construction than for others such as manufacturing. Also, the influence of experience rating cannot be identified, as the fatalities records do not show the firm size or whether the employer was experience-rated or self-insured. Such a connection would facilitate a more meaningful analysis. The self-insurance rates are only indicative, as they do not reflect variations throughout the observation period. Finally, other socio-economic factors as well as the degree of health and safety regulation and their enforcement could make a difference even in an intra-country analysis.

6   Conclusion

Workers' compensation arrangements differ between countries and effectively provide varying degrees of accountability for accidents in the contractual work relationship. The role of civil law remedies varies between jurisdictions. The situation in the United Kingdom and in the Netherlands is comparable to a system of strict liability of employers, in which tort law damages are the primary source for compensation of injured workers. Many jurisdictions, such as most Australian states, limit civil law liability of employers, and tort and contract law damages might only provide an add-on to the social security system that is the primary source for compensation. Often civil law liability is fully excluded, apart from extraordinary circumstances such as intentional harm by the employer. Example countries for such regimes are Germany, New Zealand, Canada, and the United States.

The choice of no-fault system versus strict liability does not as such determine the safety outcome. Regardless of the system of liability, employers internalize the cost of accidents, either with ex post compensation or with ex ante wage differentials. To a large degree, both regimes effectively endow employers and

employees with insurance. The extent to which moral hazard is mitigated is the most important factor for safety incentives. In this respect, the degree of liability of employers differs further between countries. Some jurisdictions, such as in Australia and in the United States, utilize several instruments to mitigate moral hazard, while for example New Zealand has integrated hardly any.

In theory, both no-fault compensation and strict liability insurance can make use of the same instruments to mitigate moral hazard. Risk classes, experience rating and reduced benefits are found in many countries. In addition, the option to self-insure potentially reduces overall accident rates. In practice however, private insurance of strict liability (prevailing in the United Kingdom and the Netherlands) seems to be better suited to adapt insurance levies to risks of individual firms. Workers' compensation schemes, in contrast, are to a large extent still directed by equity considerations, and make limited use of instruments to mitigate moral hazard. Experience rating is often restricted to a percentage discount from or surcharge to the levy. Some jurisdictions, like New Zealand, have only recently introduced experience rating. Further, the overall sum of expected compensation is higher under strict liability than under no fault compensation as it for example includes damages for pain and suffering; this is important for industry-wide safety incentives, and self-insured or self-rated firms.

The analytical framework predicts that occupational safety is influenced by the degree of employers' liability. The empirical assessment suggests that this hypothesis is plausible. A large body of research shows that experience rating and self-insurance are important factors to reduce accident rates. A comparison of international accident rates indicates that countries with higher degrees of liability are associated with lower accident rates. For example, the United Kingdom and the Netherlands with a system approaching strict liability of employers are among the countries with the lowest accident rates. Similarly, an intra-country analysis of the Australian states shows that fatal accident rates negatively correlate with the degree of common law liability and with the percentage of self-insured firms. Also the benefit level seems to have an impact: higher compensation pay-outs result in higher overall cost and therefore increase jurisdiction-wide incentives to take care. The effect of reduced pay-outs on the behaviour of employees is arguably limited since the moral hazard of employees is not as strong as for employers. Employees are to a

large extent intrinsically motivated not to get hurt, especially relating to severe injuries.

Although the empirical analysis cannot be taken as proof that the analytical framework is correct, it reveals a consistent pattern. The combination of arrangements that increase civil liability and mitigate moral hazard seems to be important for safety at work. Further research may ascertain the correlation between civil law liability and safety performance. To achieve more robust results, more precise data are needed that include factors such as firm-size and experience rating. Nevertheless, the analysis indicates that no-fault workers' compensation with the benefit of effective compensation comes with a cost: more injuries of those, which it seeks to protect.

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Appendix A   Formula for fatality rates used in Table 3

$$FR(I) = \frac{D \times 2{,}000 \times 10}{(HW_{FT} + HW_{PT})} \times 100{,}000$$

FR   Fatality Rate of an industry I in a state expressed as fatalities per 100,000 FTE

D   Number of deaths during the 10 year period in that industry and state

HW   Total Hours Worked in the industry of the state during the 10 year period

FT   Full Time

PT   Part Time

The hours worked are divided by 2,000 hours for each full time equivalent (FTE) and further by 10 for the ten year observation period.

Appendix B   Direct standardisation formula used for Table 4

$$SR(state) = \frac{\sum FR_i \times E_i}{\sum E_i}$$

SR   Standardised Rate for each state

FR   Industry-specific fatality rate of state

E   Industry-specific employment (in total hours worked) for Australia

i   Industry

Chapter 3 – Effects of No-Fault Auto Insurance on Safety Incentives

Abstract

In order to examine how no-fault motor vehicle insurance affects accident rates, insurance regimes in various countries are compared. A random effects model on IRTAD fatality data of 29 countries for the years 2005 to 2010 reveals that some motor vehicle insurance systems increase moral hazard. The incentive to take care seems not to be negatively affected by no-fault rules, but by moral hazard due to limited experience rating. Restrictions on experience rating lower the level of care taken by motorists. No-fault insurance has a detrimental effect on the safety of roads when it is combined with flat-rate premiums, as found in New Zealand or the Northern Territory in Australia. As a result, the distinction of no-fault versus tort-based third-party liability regimes is not very meaningful for analysing the effects of insurance rules on accident rates. Rather, the specific mechanisms of insurance premiums are decisive for road safety.

1   Introduction

The discipline of tort law and economics predicts that no-fault insurance systems that exclude private law liability for personal injuries reduce incentives to take care. This paper examines how the rules on motor vehicle insurance affect accident rates. There are vast differences in the way countries organise insurance for road accidents. On one end of the spectrum are countries with compulsory third-party liability insurance. This system is prevalent among European countries. In accordance with the traditional tort law system, accident victims receive compensation by the motorist's insurance only if the motorist was at fault. The other extreme are pure no-fault systems as found in New Zealand. Motorists contribute to the public insurance system with flat-rate premiums that are included in fees for vehicle registrations and in levies on the fuel price. As drivers do not pay higher premiums when they negligently cause personal injuries, pure no-fault systems create moral hazard and motorists may take less care. Previous studies compare the accident rates of jurisdictions with no-fault systems to those with third-party liability, albeit with ambiguous results.

Road accident claims are a typical example for discussing the economic effects of tort law. They happen between random parties that usually are not in a contractual relationship. The law of torts applies to situations where one person harms another. Injurer and victim may or may not be in a contractual relationship. If they were in a contractual relationship, contract law could provide damages for harm stemming from accidents. The parties could, at least in theory, determine prior to the accident who should be liable. This option is not available to random parties that did not have any contact before the accident. The applicability of tort law then solely determines the pattern of liability and hence the financial incentives for the potential parties of an accident. If tort law is excluded for a type of accidents, the liability in all such accidents is affected. There is no room for deviating contractual arrangements. Road accidents provide a good example for assessing the effects of tort law because they happen frequently and are governed by diverse rules depending on the jurisdiction where the accident occurs. Among the OECD countries, there are many states that partially or fully exclude tort law in favour of no-fault systems (see below). Other types of accidents, such as accidents during sports or recreational activities, are only in New Zealand covered by a comprehensive no-fault scheme.

Accidents in contractual relationships, as for example workplace accidents, allow different economic considerations. The risk of accidents is reflected in the wage, and the employer largely internalizes the cost of accidents, regardless of the liability arrangements. A reduction of liability should, at least in theory, have less effect than in non-contractual accidents, such as car accidents. If liability is reduced for motor vehicle accidents, parts of the accidents costs are externalized and not borne by the injurer at all, reducing safety incentives accordingly.

Motor vehicle accidents also illustrate the effects of moral hazard in insurance contracts. Both no-fault systems and tort law liability regimes come with insurance, which is mostly compulsory among the OECD countries. Victims claim compensation from the insurance, and liability of insured injurers is reduced to the amount by which the insurance premium increases, if at all. The less premiums for faulty accidents increase, the larger is the effect of moral hazard. The way insurance systems set premiums is the centre of the discussion on moral hazard.

This paper contributes to the existing literature by assessing the effects of insurance regimes on road safety in various countries. Although an international comparison is challenging in terms of availability and comparability of data, the random effects model applied here is able to yield significant results. In the following, it is argued that the insurance system as such does not matter much for overall accident rates. As drivers can also be victims and their property is not insured by no-fault systems, they keep incentives to take care regardless of the applicability of tort law. In respect to accidents with pedestrians, however, which neither threaten the integrity of the motorist nor the vehicle, higher crash rates can be expected in systems that do not sufficiently account for moral hazard in insurance premiums.

The analysis starts with a review of empirical work addressing the potential effects of no-fault systems on accident rates. This is followed by a description of the analytical framework that explains the theoretical effects of different legal rules on motorists' incentives to take care. To prepare an empirical analysis of fatality rates, the characteristics of the insurance systems in various countries are outlined in the subsequent section. Finally, data from the International Traffic Safety Data and Analysis Group (IRTAD) comprising of fatality rates of 29 countries for the years 2005 to 2010 are analysed using a novel approach that distinguishes the effects of insurance systems on overall fatality rates from the effects on pedestrian fatalities.

The paper concludes with a discussion of the results of the random effects regression estimates.

2 Literature Review

Investigating the effects of no-fault systems on road safety, previous research comes to ambiguous results (Anderson et al. 2012, p. 80). The majority of empirical studies find an increase of traffic accidents compared to tort regimes, while few conclude that there is no effect of no-fault insurance systems. Most studies make use of data from the early years, when no-fault legislation was introduced or modified, in order to compare the effects within jurisdictions. Most research has been undertaken for the US states, some other studies refer to Canada, Australia, and New Zealand.

2.1 United States

Analysing vehicle accident data of the United States for the years from 1967 to 1976, Landes (1982) finds that states with tort restrictions have experienced significantly increased fatal accident rates relative to states that have not restricted liability for motor vehicle accident injuries. She estimates that states with more restrictive laws have had as many as 10 to 15 percent more fatal accidents. With longer time periods and additional variables used, subsequent studies were not able to replicate her findings.

Kochanowski and Young (1985) analyse US accident rates for the years from 1975 to 1977. Controlling for drivers' age and gender, population density, income, alcohol consumption, speeding and alcohol offences, the authors could not establish a statistically significant relationship between insurance type and fatal accident rates (they are weakly inversely related, though). Their probability regression model, however, is able to explain most of the state-to-state differences. For instance, fatalities are more likely to happen in states with a high percentage of young drivers, with more male drivers, and with lower per capita income. Also fatality rates are lower in more densely populated states.

Similarly, Zador and Lund (1986) do not find a statistically significant relationship between no-fault laws and accidents in the United States for the years from 1967 to 1980. They group the states into those with low and those with high restrictions of tort law liability for pain and suffering. Only in one of 14 regression analyses, the effect of no-fault auto insurance laws on fatal crashes was found to be

statistically significant, albeit for those states with a low restriction on tort and only with a slight impact.

Sloan et al. (1994) analyse US fatal accident data for the years from 1982 to 1990 aggregated by state, year, and age groups. The authors conclude that tort liability has a deterrent effect on careless driving. Compulsory first-party personal insurance increases fatality rates of adults, but more so when victims simultaneously are precluded to sue. Compulsory liability insurance does not reduce the deterrent effect if premium surcharges are imposed in case of fault. Young drivers do generally not respond as much to insurance incentives as adults. The availability and affordability of alcohol, however, increases accidents especially for drivers under the age of 25.

Cummins, Phillips, and Weiss (2001) analyse motor vehicle accident fatality rates in all U.S. states over the period from 1968 to 1994. They take potential endogeneity of no-fault laws into account, meaning that the compensation regimes adopted by the states may be systematically related to accident rates or other state characteristics. Controlling for alcohol consumption, speed variance, annual snowfall, rural miles driven, hospital proximity, drivers' age, education, and income, they find that no-fault weakens incentives for careful driving and leads to higher accident rates compared to tort. The results suggest that no-fault is associated with a median predicted increase in fatality rates of 13.8 percent. A further important factor is experience rating that can be used to blunt the adverse incentive effects of no-fault.

Loughran (2001) applies a differences-in-differences regression to accident data from the lower 48 US states and Hawaii, comparing no-fault and tort states before and after the implementation of no-fault systems during the 1970s. Controlling for several variables such as population density, population age, weather conditions, income, and education, the author establishes that the relative fall of fatal accident rates between 1967 and 1980 did not differ between tort and no-fault states. Also in respect to overall accident rates, the author finds little effect of no-fault insurance. The estimations seem to indicate that no-fault states have lower accident rates. Further, using data from a US federal fatal accident reporting system, the author can reject that no-fault insurance has an impact on drivers' negligence. Loughran (2001) finds that there are hardly any differences in driving behaviour, such as the failure to keep in the proper lane, to yield the right of way, or to obey

traffic signs, speeding, and drink driving. The more general classification of "erratic, reckless, or negligent driving", however, was cited more often in no-fault states as a factor contributing to accidents.

Similarly, Derrig et al. (2002) testing for the effect of seat belt usage do not find significant effects of the insurance system (no-fault, tort, or mixed). Assuming that no-fault and mixed systems indicate higher risk taking incentives, they use both dummy variables and instrumental variables correlating with no-fault systems as a proxy for risky behaviour levels. These variables appear to have little significant effect on fatality rates.

Separating insured and uninsured drivers, Cohen and Dehejia (2004) estimate moral hazard effects of auto insurances. Their panel analysis of US accident data and insurance information for the years 1970 to 1998 reveals that compulsory insurance increases the number of fatalities. The reduction of liability that comes with no-fault rules further results in a significant increase in accident rates. The authors conclude that drivers' behaviour is influenced by financial incentives, and that the introduction of no-fault insurance in the US has cost more than 5,000 lives annually.

For their regression analysis, Marco et al. (2007) take the differences of the various no-fault rules in the US into account, and concentrate on those no-fault states that limit tort liability (in contrast to add-on states that do not restrict the victims' right to sue). Using data that spans 1967 to 1994, the authors find that no-fault rules increase fatality rates. They also distinguish the effects of no-fault insurance on precaution and on activity, and ascribe the higher accident risk under no-fault legislation to the fact that drivers tend to take less care, rather than to drive more.

Heaton and Helland (2008) find little evidence that drivers under no-fault systems cause more accidents. They use data from police accident records in New Jersey, North Carolina, and Utah, covering different periods between 1996 and 2006. Focussing on accidents involving drivers from other states, they test whether out-of-state drivers from no-fault states have higher rates of negligent accidents than those from tort states. Controlling for several location, driver, and vehicle variables, the linear probability model does not yield a significantly higher likelihood of at-fault accidents for drivers from no-fault systems.

2.2 Canada

Analysing the effects of the introduction of a pure no-fault regime in Quebec, Devlin (1992) finds that accidents have increased in the new regime. The author estimates regression coefficients for fatal accidents, bodily injuries, and property-damage only accidents in Quebec between 1971 and 1984 and in Ontario between 1967 and 1984. She controls for the proportion of young male drivers, kilometres driven, traffic code changes, and criminal traffic offences, and concludes that the Quebec no-fault regime resulted in an annual increase in fatal accidents of over 9%.

Similarly, Gaudry (1992) concludes that the new regime in Quebec resulted in a substantial increase in accidents. He estimates that the no-fault system as such contributed to the reduction of driver care and deterrence to a small degree only. In contrast, the uniform premium system for bodily damages created adverse selection with a strong effect. The author cannot separate the individual influence of compulsory insurance, no-fault system, and flat-rate premiums, though.

A further reform of the no-fault insurance system in Quebec gave Dionne et al. (2011) an opportunity to test for moral hazard of drivers. Since 1992, the accumulation of demerit points does not only endanger driving licences, but also increases the fees to be paid for the regular renewal of the driving licence. The authors find that drivers react to these incentives. Before 1992, drivers would increase efforts for careful driving in accordance with the demerit points collected. The additional premium increases after the reform lead to a further 15% reduction of traffic violation frequencies.

2.3 Australia and New Zealand

For Australia and New Zealand, McEwin (1989) estimates the effects of the introduction of no-fault insurance systems. Applying data for the years 1970 to 1981 to a fixed-effects model, he finds a 16 percent increase in fatality rates for New Zealand and the Australian states that abolished the right to sue for personal injury loss. In contrast, no such effect was established for the Australian states that did not exclude access to tort law. In a similar estimation using pooled ordinary least square (OLS) regressions, Swan (1984) discovers an almost 20 percent increase of death rates after the introduction of no-fault schemes in New Zealand and the Australian Northern Territory.

Conversely, Brown (1985) concludes that the removal of tort liability in New Zealand has had no apparent adverse effect on road safety. He relies on descriptive statistics for the period from 1964 to 1980, and notes that the downwards trend in accident rates continued after the introduction of the no-fault system in 1974. He does not control for safety affecting variables. Equally, Hause (1995) compares fatality rates of the period from 1974 to 1987 in New Zealand, Australia, and the United States, and does not establish evidence for adverse effects of New Zealand's no-fault system on motor vehicle accident rates.

3 Analytical Framework

Tort law theory appears to be confirmed by the findings of the majority of the empirical studies according to which no-fault insurance systems are correlated with increased motor vehicle accident risks compared to tort regimes. Drivers respond to monetary incentives and take less care if their liability is reduced. This result is, however, also somewhat unexpected as both tort law and no-fault systems involve insurance and moral hazard of some degree should exist in both regimes. In this respect, the result of the minority of empirical research, that is, no-fault systems do not increase accident risk, seem to be plausible, too. Theoretical work on no-fault systems often assumes insurance effects away, which is unrealistic given that no-fault is both a liability rule and an insurance system (Liao and White 2002, p. 264). The following section outlines the framework for incentives to drive safely and includes both sides of the theory. From this analytical framework, the hypothesis for the remainder of the analysis is formulated. Motorists do not react strongly to monetary incentives from insurances. Regardless of the insurance regime, drivers exercise caution to protect their own personal integrity and property (first-party effect). The choice of no-fault insurance may, however, have an effect on the level of care regarding other persons' physical integrity (third-party effect).

3.1 Liability in Bilateral Accidents

The law and economics literature on torts suggests that liability for third-party damages induces an optimal level of care, regardless of the form of liability. A negligence rule incentivizes an optimal level of care and deters dangerous behaviour. Drivers try to minimize the expected cost of accidents that is the sum of probable accident losses and investment in safety (Calabresi, 1968). The social cost of failing

to take due care is fully internalized by the motorist under negligence liability (Arlen, 1993, p. 1109). More severe forms of liability, like strict liability, will not increase safety levels since drivers cannot reduce expected costs with higher investments. Care levels under strict liability in bilateral accidents are not optimal, though, because victims have no incentive to take care (Shavell, 1987, p. 11; 2005, p. 3). The likelihood of accidents can be reduced by driving more carefully, by using safer cars, or by reducing the activity level, that is by driving less. Driving more carefully can be regarded as an investment since it requires time and effort by the driver, which decreases the utility of a journey in form of travel time, and probably also in form of joy. Safety of cars can be increased with investments, be it the purchase of newer models or the regular maintenance of safety affecting equipment, such as tyres and brakes. The risk of liability can induce people to drive less. Unnecessary journeys, like cruising, can be avoided. Commuters can choose public transport instead of their own cars. One large weekend trip to the supermarket can be favoured over several shopping tours in the week, and so on. Shavell (2005, p. 5) points out that no liability rule results in socially optimal levels of activity. Either the injurer or the victim engages excessively in their activity. Under a negligence rule, injurers and victims do not increase their respective expected accident costs with higher activity levels as long as they take due care. Under strict liability, injurers will choose the optimum level of activity, but victims do not since they do not bear their losses regardless of their activity level.

The determination of negligence as the optimal liability rule is made under the assumption that judges find the optimal standard of due care when deciding on the negligence of an injurer (Liao and White, 2002, p. 261). This assumption may seem unrealistic for single decisions, but can hold true over time with repeated cases in similar situations. More problematic with this concept is that the assumption results in circular reasoning: the liability rule is socially optimal when the liability is set on an optimal level. Nevertheless, the bilateral accident model has value for comparing the tort law regime with no-fault systems. Tort law has the theoretical potential to achieve efficient rules by which the level of care is set optimally.

In contrast, pure no-fault systems exclude liability of injurers, and hence are expected to reduce incentives to take care (Kornhauser, 1985, p. 1035; Trebilcock, 1989, p. 27; Arlen, 1993, p. 1111). Since potential injurers would not benefit from

increasing safety efforts in relation to other persons, the deterrence effect of tort law is missing. Investments in safety that might reduce the risk to cause injuries of other traffic participants would only benefit those persons, but not reduce the expected accident costs of the injurer. Equally, victims are likely to take less care under no-fault rules as they are not potentially liable for own contributions to the accident. Contributory negligence that is considered an important element for optimal care levels of victims does not exist in no-fault systems.

3.2 Reciprocity of Accidents

Reciprocity is a further consideration for determining the likelihood of safety effects of a legal regime. Let us assume that the exclusion of liability increases the risk of accidents. Drivers will respond to that risk since they are not only potential injurers, but also potential victims (Parsons, 2003, p. 457). In order to avoid own harm, they pay more attention to other drivers' behaviour. The reciprocity of accident risk might just compensate for the decrease of the original incentives to take care. Similarly, pedestrians, who only can be victims in a car accident, will be aware of the generally more dangerous state of roads, and adapt their behaviour accordingly. For example, they might not unconditionally trust cars to stop at red lights or zebra crossings.

3.3 Effects of Insurance

Importantly, insurance affects drivers' behaviour (Devlin, 1990). Insured drivers can partially externalize accident costs to the group of insured persons. Information asymmetries in insurance contracts result in moral hazard, that is, insurance companies are not able to monitor the behaviour of drivers or generally to distinguish sharply "bad" drivers from "good" drivers.[124] In principle, the insurance regime does not matter for moral hazard effects. No-fault regimes involve first-party insurance for the driver's own personal injuries, as well as the exclusion of liability for other parties' personal injuries. Under no-fault, the driver will not be liable for anyone's personal injuries. Insurance based on traditional tort law does not necessarily have another result. Compulsory third-party insurance transfers the

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[124] A related issue is adverse selection: high-risk drivers cannot be identified ex ante and hence not be charged more. Low-risk drivers might opt out, which increases the risk in the insurance pool. In the context of automobile insurance, this is generally dealt with by making motor vehicle insurance compulsory. In both, third-party liability regimes and no-fault systems, adverse selection problems hence do not persist.

liability of the driver for damages of other drivers, bikers, passengers and pedestrians to the insurance. Further, own injuries are often covered by health insurances (private or public). In result, the liability effectively may not differ much between no-fault and tort law insurances (Schwartz, 2000, p. 641). What is more important is the way moral hazard is mitigated. Insurance companies can, for example, raise premiums in case of a faulty accident; or make the premium dependent on the type and age of the car, or the experience of the driver (driver's age or number of years since the driver's licence was granted).

In principle, both no-fault insurances and tort liability insurances can mitigate moral hazard to the same extent and with the same instruments. For example, they can adjust the premium for a driver who was at fault, ex post when an accident has happened. It has been shown empirically that experience rating matters for the mitigation of moral hazard (Ceccarini, 2007; Dionne et al., 2013; Shi et al., 2014; but see Abbring et al., 2003; Carlier et al. 2013). The prospect of an increase in premiums restores some of the incentives, and the bonus-malus systems employed by motor vehicle liability insurances mitigate moral hazard, but the effectiveness of the mitigation depends on the amount of surcharges and discounts that are applied. As will be seen below, some countries regulate the premium setting of private insurance markets and restrict the variation of premiums.

In practice, however, no-fault regimes often are governed by a centralized public insurance system that is not able to adjust premiums as flexibly as private insurances. The way public systems can mitigate moral hazard is prescribed by legislation which is static by definition. Public insurance companies also tend to be more concerned with equity considerations, such as affordability (Schwartz, 2000, p. 647). Private insurances, in contrast, can alter the conditions for their contracts, within the boundaries of insurance and consumer laws, and react flexibly to statistical findings of hazards. For example, private insurances monitor the expected accident costs of specific models and makes of cars. The premiums for individual cars can be adjusted accordingly. Insurances also may individualize premiums taking into account the driver's age, gender, and activity levels (annual mileage driven). Further, past (faulty) accidents of drivers or car holders increase premiums, while discounts are granted to motorists with an accident free driving history.

Additionally, the insurance of property damage has an effect on care levels of drivers. First-party property insurance introduces another level of moral hazard, and effectively further equalizes the differences between incentives in no-fault and in tort regimes. Although instruments to mitigate moral hazard are again available, these cannot level out the effect of externalizing accident costs to insurances.

3.4   Hypothesis

The degree of liability, third-party and first-party insurance, and the way these mitigate moral hazard, together determine incentives to take care. The analysis of the effects of insurance systems needs to recognize these insurance features and cannot be limited to an observation of accident rates in no-fault systems compared to those in tort law regimes. The complexity may explain the divergent results of the previous empirical studies, which include the considerations outlined above to various extents.

Therefore, the system of no-fault should not matter as much as the insurance mechanisms used, and the effects should be felt more vis-à-vis pedestrians compared to motorists. Before this hypothesis is empirically tested, the following section describes the various forms of automobile insurance system found in different countries, and how these set insurance premiums.

4   Institutional Arrangements

Insurance arrangements for personal injuries differ significantly between the countries that are covered by the IRTAD database. On the one side of the extreme is the traditional tort based system found in the European Union. Third-party liability insurance is compulsory and covers both personal injuries and property damages of accident victims that arise from culpable conduct of the motorist. The other extreme is a pure no-fault system that is based on equity considerations and demands equal contribution from potential injurers. The main goal of such a system is effective compensation of victims (Schwartz, 2000, p. 622). An example country with a pure no-fault system is New Zealand. All persons injured in an accident are compensated regardless of who was at fault. This section starts by contrasting these two extreme approaches and then introduces mixed systems that are found in other countries.

4.1   European Countries

The insurance system for motor vehicles is by and large harmonized within the European Union states. According to EU legislation, member states have to have a system of compulsory third-party liability insurance for personal injuries and property damages.[125] As a consequence, all EU states, as well as the states of the European Free Trade Association (Switzerland, Norway, Iceland, and Lichtenstein)[126] require motorists to take out private vehicle insurance, which usually calculate premiums according to the specific risks of the insured, such as the vehicle's model and make, its age, the experience of the driver, demerit points or no-claims discounts. Differentiation of premiums by gender that had been commonly employed was declared illegal by the European Court of Justice, on grounds of violating non-discrimination laws.[127] Private first-party insurance is widely available, but not compulsory.

Among the European countries, only Sweden has a no-fault auto insurance system for personal injuries. Swedish motorists are required to buy a vehicle insurance that covers third-party damages and also includes a no-fault component for personal injuries. The driver, passengers, cyclists and pedestrians are compensated by the insurance, regardless of who was at fault. The comprehensive motor insurance with third-party and first-party elements is offered in a single package by private insurances, which set premiums according to individual risk classes.

4.2   New Zealand

In New Zealand, a comprehensive, pure no-fault accident insurance system exists that is run by the government-owned Accident Compensation Corporation (ACC). All victims of accidents within the country are insured for personal injuries, regardless of who is at fault. All sorts of accidents are covered, not only motor vehicle accidents. As a result, victims of vehicle accidents are automatically insured

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[125] EU Directive 2009/103/EC of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability, OJ L 263, 07.10.2009, p. 11–31, replacing five prior directives from 1972, 1983, 1990, 2000, and 2005.

[126] Lichtenstein is not part of the IRTAD data set. Three of the EFTA countries are bound by the EEA agreement or in case of Switzerland have introduced compulsory third party liability insurance on their own account.

[127] European Court of Justice, Case C-236/09, *Association belge des Consommateurs Test-Achats ASBL*, judgement of 1 March 2011.

for bodily injuries, including drivers, cyclists, and pedestrians. Motorists contribute to the accident compensation system in two ways. A flat-rate premium is paid together with the annual vehicle registration. The vehicle classes that determine the premium are very basic. For example, the only class for passenger vehicles includes cars, taxis, buses, and mini vans, and does not differ as to the car's size or engine power. Only petrol and diesel engines are distinguished, as well as three classes for motorcycles that depend on the engine size. In addition, petrol prices include an insurance levy that currently amounts to 9.9 cents per litre.[128] Diesel is excluded from the fuel levy, but diesel vehicles pay higher licence fee levies.

As a consequence, premiums for the no-fault personal injury insurance do not reflect the individual risks of motorists. Beginning with 2015, new risk classes for light passenger vehicles based on crash safety ratings apply.[129] These new licence fees introduce subclasses for vehicles depending on their risk, but still do not take personal accident histories of car owners into account.

Tort claims for personal injuries are excluded in New Zealand.[130] Private law liability therefore only relates to property damage. Third party liability insurance is available, but not compulsory. Private insurance companies offering such insurance may take individual drivers' accident history into account for determining premiums.

4.3   Australia

Each Australian state and territory has its own rules for motor vehicle insurance. The Australian Capital Territory, New South Wales, Queensland, South Australia, and Western Australia have a system of compulsory third-party insurance. The insurances compensate personal injuries of other drivers, pedestrians, and cyclists only to the extent that the motorist was negligent. Liability for property damages and the risk of own damages may be insured voluntarily. The Northern Territory has a pure no-fault system that is most similar to New Zealand. All victims of motor vehicle accidents in the Northern Territory are compensated regardless of fault.[131] Tasmania and Victoria employ a mixed system, by which third parties are

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[128] Accident Compensation (Motor Vehicle Account Levies) Regulations 2014.
[129] ACC, Levy Consultation, available at http://www.acc.co.nz/about-acc/consultation/levy-consultation/index.htm (last accessed 11 September 2014).
[130] Accident Compensation Act 2001, s. 317; the only exception are punitive damages which are very rarely granted.
[131] The insurance is provided by the government-owned TIO and funded through a portion of the vehicle registration charges.

only compensated if the motorist is at fault, while motorists are compensated for own injuries with a basic cover even if they are at fault. New South Wales has a no-fault component for catastrophic injuries through the Lifetime Care and Support scheme (Allsop et al., 2009, p. 4). First-party compensation can be excluded in the no-fault systems when the driver acted intentionally, or was under the influence of drugs, or alcohol over the legal limits.[132]

Generally, third party liability is determined by standards of common law, and includes damages for non-economic loss such as pain and suffering. Access to tort law is only excluded in the Northern Territory, but not for non-resident drivers that travel to the territory. South Australia and Victoria have established a threshold to sue for damages from personal injuries, meaning that tort damages are only available for serious injuries.

The Australian motor insurance landscape is heterogeneous with compulsory third-party systems, no-fault and mixed regimes, publicly provided insurances, and competition of private insurers. However, premium setting is regulated in all states. With the exception of the private insurance systems of New South Wales and the Australian Capital Territory, the governments of the states and territories determine the applicable rates. In Queensland, where also private corporations provide for motor vehicle insurances, the government specifies a price range for premiums.

Premiums in Australia are set according to about twenty vehicle classes that may distinguish privately from commercially used cars, and passenger cars from motorcycles, busses and trucks. However, more detailed classes as to specific risks of certain car models and engine sizes are not scheduled by the government agencies responsible for the motor insurance systems. Further, most states do not have individualised premiums that take personal attributes or the accident history of the motorist into account. Only New South Wales gives the private insurance companies wide discretion for determining premiums, and allows factors such as individual accident records, demerit points on the driving licence, or the age of all regular drivers of the vehicle. However, the government agency regulates maximums for surcharges on the base premium in order "to keep insurance affordable for the poorer

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[132] The exclusion for driving under the influence is different from New Zealand where accident compensation is only reduced for persons committing serious crimes, sec. 120 and 122 NZ Accident Compensation Act 2001. Once more, no-fault has a different meaning in different countries.

risks".[133] The higher the base premium, the smaller the malus is that may be applied. Individualised rates may be used in the Australian Capital Territory as well. Until recently, there has been only one accredited insurer, however, and rates are still only set according to the basic vehicle classes.

4.4   Canada

The auto insurance system in Canada is governed by rules of the provinces and territories. As a consequence, Canada exhibits diverse arrangements for auto insurances (an overview is presented by Kelly et al., 2010). British Columbia, Saskatchewan, Manitoba, and Quebec have government run auto insurance systems for personal injuries, providing for the minimum required coverage, while private companies offer top-up insurances for property damages.[134] In the remaining nine provinces and territories, private companies provide motor vehicle insurance. The publicly run insurances are no-fault insurances, meaning that they compensate victims and injurers regardless of fault. Since 2006, Saskatchewan offers the choice between the public no-fault insurance and private tort-based insurance.[135] Among the private insurance systems, Ontario has no-fault insurance for bodily harm.

Access to tort law is fully restricted only in Manitoba and Quebec, and in Saskatchewan for drivers who chose the public system.[136] The private no-fault system of Ontario establishes verbal thresholds[137] for the access to tort law; seriously injured victims can sue for economic loss above the no-fault compensation and for non-pecuniary loss such as pain and suffering.[138] The publicly run no-fault insurance of British Columbia does not restrict tort law. Full tort law compensation is available for victims, and is paid by the public insurance from the policy of the negligent

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[133] NSW Motor Accident Authority, Practice Note: Premiums Determination Guidelines, 30 June 2014, pp. 3-4, available at http://www.maa.nsw.gov.au/default.aspx?MenuID=170.

[134] Part 2 of The Manitoba Public Insurance Corporation (MPIC) Act, CCSM c P215; Title II of Quebec's Automobile Insurance Act, RSQ c A-25; Part 7 of British Columbia's Insurance (Vehicle) Regulation, B.C. Reg 447/83; Saskatchewan's The Automobile Accident Insurance Act, RSS 1978, c A-35.

[135] See s. 40.2(1) of Saskatchewan's The Automobile Accident Insurance Act.

[136] See e.g. s. 72 of Manitoba's MPIC Act; s. 83.57 of Quebec's Auto Insurance Act.

[137] Verbal thresholds do not set a specific dollar amount of damages to allow private claims, but rather describe thresholds with terms such as 'permanent and serious disfigurement or impairment' that have to be interpreted by courts in a particular case.

[138] S. 267.5 (3) and (5) of Ontario's Insurance Act, R.S.O. 1990, c I.8.

motorist. Other provinces with private insurance systems place a cap on the amount to be paid in tort law claims for non-pecuniary damages from minor injuries.[139]

The Canadian patchwork of motor insurance laws is, with respect to incentives to take care, actually quite homogeneous. Except Quebec, all provinces and territories allow for experience rating, although the methods of premium calculations are regulated by the governments to various degrees. The fault of the driver plays a role in the calculation of the insurance premium. The premiums in jurisdictions with private insurance show wider variations though, with young drivers paying higher premiums. Public insurance providers avoid, as a matter of public policy, discrimination based on age or gender.[140] Only Quebec has a pure no-fault system for personal injuries, with a flat-rate premium for the vehicle insurance depending on the basic vehicle class. The premium for the public insurance is paid with the renewal of the vehicle registration, and does not depend on the individual accident history. However, demerit points on the driver's record for traffic code violations, such as excessive speeding, are considered for the calculation of the insurance contribution that is part of the fee for the driving licence that is to be renewed regularly.[141] In addition, private third-party property insurance is compulsory. Premiums for this insurance may be based, among others, on demerit points and accident history.

4.5   United States

Almost all jurisdictions in the United States have a compulsory third-party liability insurance regime for motor vehicle accidents, comparable to the majority of European Union countries. The insurances cover bodily injuries and property damages of third parties, based on the fault of the insured motorist. The insurances are provided by private underwriters that have wide discretion to set premiums according to specific vehicle risk classes and individual characteristics of motorists. The only exception is New Hampshire, which does not demand third-party liability

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[139] See e.g. Alberta, Minor Injury Regulation, AR 123/2004, (MIR), upheld by Alberta Court of Appeal, Morrow v. Zhang, 2009 ABCA 215 (CanLII); s. 113B (1) and (4) of Nova Scotia's Insurance Act, R.S.N.S., c.231, upheld by Nova Scotia Court of Appeal, Hartling v. Nova Scotia (Attorney General), 2009 NSCA 130.

[140] BC Ministry of Finance, Review of Insurance Corporation of British Columbia, 2012, p. 21 (available at http://www.fin.gov.bc.ca/ocg/ias/pdf_docs/ICBC_Review_2012.pdf).

[141] See SAAQ, http://www.saaq.gouv.qc.ca/en/driver_licence/licence_cost_2014.php.

insurance, but requires that drivers demonstrate that they have sufficient funds to pay damages in case they are at fault in an accident.[142]

Most states have a classical tort liability regime that allows victims of motor vehicle accidents to sue negligent motorists for damages from economic and non-economic loss. A number of jurisdictions have a no-fault regime that comes with a first-party no-fault insurance and restricts tort liability. In no-fault states, the motorist's own insurance company compensates the policyholder for the cost of minor injuries, which is known as personal injury protection (PIP). The extent of coverage differs between states, but generally non-economic loss such as pain and suffering is not covered by PIP. Theses jurisdictions establish a threshold for the right to sue for damages in case of severe bodily injuries. Florida, Michigan, New Jersey, New York, Pennsylvania, and Puerto Rico use verbal thresholds, while Hawaii, Kansas, Kentucky, Massachusetts, Minnesota, North Dakota and Utah have monetary thresholds. Three states, namely New Jersey, Pennsylvania and Kentucky, give motorists the choice between no-fault and tort liability policies. (Insurance Information Institute, 2010, pp. 55-56).

Ten states have a so-called add-on system. No-fault first-party insurance is available next to the third-party insurance, but in contrast to the "true" no-fault jurisdictions, access to tort law claims is not restricted. The additional PIP coverage is compulsory in Arkansas, Delaware, Maryland, and Oregon; it is optional in New Hampshire, South Dakota, Texas, Virginia, Washington, and Wisconsin. Finally, drivers in the District of Columbia have the option of no-fault or fault-based add-on coverage, but no-fault drivers retain the right to either file a claim against the other party or to accept the no-fault benefits.[143]

There have been some changes in the adoption of no-fault auto insurance systems since their inceptions in the early 1970s. Florida temporarily repealed its no-fault system with effect of October 2007, only to reintroduce it in January 2008. Similarly, Pennsylvania did not have no-fault auto insurance between 1984 and 1990. Nevada has repealed no-fault insurance in 1980, Georgia in 1991, Connecticut in 1993, and Colorado let it expire in 2003. The main reason given for changes in no-

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[142] IIC, http://www.iii.org/issue-update/compulsory-auto-uninsured-motorists.
[143] III, http://www.iii.org/issue-update/no-fault-auto-insurance

fault laws are high costs associated with the insurance system and consequently high insurance premiums.

4.6 Israel

A further no-fault system for motor vehicle accidents is found in Israel. Insurance for bodily harm on a no-fault basis is compulsory,[144] and offered by several private insurance companies. In contrast to other no-fault regimes, the compulsory insurance relates to a liability of the driver towards the victims, such as occupants of the same car and pedestrians. Effectively, the law establishes a strict liability of the drivers combined with a compulsory liability insurance that also covers the bodily harm of the driver regardless of fault. The amount of compensation for economic and non-economic damage from motor vehicle accidents is limited to certain ceilings set by legislation.[145] Property damages are not included, but additional insurance may be purchased. Since a reform of the insurance regime in 2000, the premiums of the compulsory no-fault insurance may reflect the claims history of the motorist (Cohen, 2005, p. 201; OECD, 2011, p. 34).

(In addition, the Israel fund for motor vehicle insurance covers insurance for motor vehicle drivers who were unable to obtain insurance, and for victims of hit-and-run accidents. About 90 percent of those insured through the fund are motorcycle owners, exhibiting a very high claims frequency.[146])

4.7 Japan

Japan requires motorists to have third-party insurance for bodily injuries.[147] Owners of motor vehicles are liable for bodily injuries arising from traffic accidents unless they can prove that the driver exercised due care, the victim or another person was at fault, and the motor vehicle was not defective.[148] Contrary to general tort law, the burden of proof is therefore shifted from the victim to the motorist. Voluntary automobile insurance for property damages and self-incurred harm is available. Premium rates for both voluntary and compulsory insurance are recommended by the nonprofit General Insurance Rating Organization. Premiums for the compulsory

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[144] Motor Vehicle Insurance Ordinance, 5730-1970, as amended.
[145] Road Accident Victims Compensation Law, 1975, Art. 1(4) and Art (8).
[146] Israeli Ministry Of Finance, The Capital Markets Insurance And Savings Division, Insurance Annual Report 2012, p. 80.
[147] Japan's Automobile Liability Security Act of 1955.
[148] General Insurance Rating Organization, "Automobile Insurance in Japan", 2014, p. 4.

insurance are set according to automobile classes that distinguish the type, size, and use of the vehicle. An individual bonus-malus system that takes the claims history of the insured into account has not been established.[149]

4.8   South Korea

In South Korea, motor vehicles must be insured for bodily injuries caused by accidents. The compulsory insurance covers liability without fault, effectively establishing strict liability of drivers.[150] The compulsory insurance for bodily injuries does not cover the driver, and the amount of compensation is established by tort law. A government plan ensures that compensation is available to victims of uninsured vehicles and hit-and-run accidents. Third-party liability insurance for property damages became compulsory in 2005.[151] Further insurance for comprehensive property coverage and drivers' harm is available. Premium setting has been increasingly liberalised since the early 2000s, and rates can be set according to several risk factors, such as vehicle classes and individual drivers' characteristics.

4.9   Appraisal of the Different Insurance Systems

Among the countries of the IRTAD database, the most common system for motor vehicle insurance is compulsory third party liability insurance that includes bodily injuries and damages to property. Liability of motorists is determined in accordance with the fault principle of tort law. Insurance premiums take specific vehicle classes and individual accident records of vehicle owners into account.

Several jurisdictions employ a no-fault insurance regime that covers motorists for their own bodily harm, and that of other victims who are not driving, such as passengers, cyclists and pedestrians. No-fault consists of first-party and third-party elements, but does not include property damages. Effectively, no-fault insurance can either amount to strict liability, liability conforming to negligence or to no liability, depending on how premiums are set. Public no-fault insurances often use flat-rate premiums, which removes individual liability of motorists (examples are New Zealand and most Australian states). In contrast, some no-fault systems determine premiums that are based on the individual accident history regardless of fault, thus creating liability that is akin to strict liability (Sweden, Israel, and Korea).

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[149] Ibid, p. 10.
[150] Korea's Guarantee of Automobile Accident Compensation Act of 1963 (Law no. 1314).
[151] Korean Insurance Development Institute, Automobile Insurance in Korea, Fact Book 2013, p. 20.

Other jurisdictions take the fault of the motorists into account when determining the rates for the no-fault insurance (British Columbia, Saskatchewan, Manitoba, and Ontario).

As no-fault systems regularly limit access to tort law and therefore the amount of liability, no-fault states should exhibit a higher degree of moral hazard than tort law states. Given the scope of flat rate premiums, moral hazard of motorists can in turn be expected to be higher in New Zealand and Australia than in the other no-fault countries in the IRTAD dataset. The discretion of insurances to set premiums according to individual risks is also restricted by government regulation in Japan, South Korea, and in large parts of Canada and the United States. Therefore, also in these countries overall rates for motor vehicle insurance do not reflect drivers' risks to the same degree as the third-party systems in the majority of countries.

Since insurance of damages to the motorist's own property is voluntary in all countries, and private insurance for these damages makes use of individualized premiums, the incentive to take care should remain largely intact even for motorists that have no-fault protection of own bodily harm. If an effect of no-fault insurance on the behaviour of motorists can be seen, it should most clearly be visible in relation to injuries of pedestrians. Accidents involving pedestrians are not likely to damage motor vehicles or to harm their occupants.

5   Method

The effect of motor vehicle insurance systems on the care taken by drivers is most likely stronger in relation to the safety of pedestrians. Therefore, the following analysis is applied to both, traffic fatalities and pedestrian fatalities. This approach allows identifying possible effects of no-fault regimes and rate restrictions on injurers and victims respectively. Overall fatality rates represent the risk of all traffic participants and include drivers who can be both injurers and victims. The fatality rates of pedestrians single out the care taken by motorists in relation to third persons. By and large, a collision with a pedestrian does not endanger the personal integrity or property of the motorist.

To estimate the effect of no-fault systems and of moral hazards on fatality rates, a random effects model is applied to time-series cross-sectional data as suggested by Bell and Jones (2014). The random effects model allows incorporating

time-invariant descriptors of the countries' insurance regimes. Although a simple ordinary least squares (OLS) regression with pooling of observations across time and countries would also estimate time-invariant variables, such a method would assume that there are no differences between the countries, and therefore may likely produce biased standard errors. Previous studies have used fixed effects models that include country-specific descriptors that changed from one period to another; they measured the within-country difference in road fatalities of a no-fault jurisdiction before and after the introduction of no-fault rules. A fixed effects model can, however, not evaluate time-invariant variables, which this analysis is particularly interested in. During the more recent period that is under consideration here, the rules of motor vehicle insurance systems have not changed in the observation countries. The random effects model treats unobserved country specific effects as an error term. It assumes that no correlation exists between the unobserved country-specific effects and the (observed) regressors. This is a strong assumption which is hard to verify in non-experimental studies. A solution to this shortcoming is the formulation developed by Mundlak (1978), which is used here. The group means of the time-varying variables are included in the regression, effectively ensuring that the remaining random effect in the error term is not correlated with the explanatory variables of interest.

The specification of the random effects model with the Mundlak formulation is as follows:

$$y_{it} = \beta_0 + \beta_1 x_{it} + \beta_2 \bar{x}_i + \beta_3 z_i + (u_i + e_{it})$$

where y_{it} is the dependant variable of the two regressions, i.e. the overall fatality rate or the fatality rate of pedestrians respectively, relating to each country i in time t. β_0 denotes the intercept term, x_{it} is a series of time-varying covariates, described below, whose effect is measured with coefficient β_1, and $\bar{x}_i$ is country i's mean of each x for the entire time period being the time-invariant component of those variables (Snijders and Bosker, 2012, p. 56), that controls for the between countries effect. While β_1 is an estimate of the within country effect, the coefficient β_2 expresses the difference between the within and the between effect (Bell and Jones, 2014, p. 9). Further, z_i are the country-specific time-invariant covariants, measuring the effects of insurance systems and moral hazard with coefficient β_3. The random part of the specification

consists of u_i, that is the country-level residual for country i, and e_{it}, the residual for country i at time t. It is assumed that u_i and e_{it} are normally distributed.

6   Data Sources

Observations from the IRTAD database were used, providing the number of fatalities from motor vehicle accidents in 29 countries within the six years from 2005 to 2010. Among the 30 countries that report accident data to IRTAD, Cambodia does so only since 2008, and was therefore excluded from the analysis. The IRTAD data allow distinguishing death type by road users, thus giving both total fatality counts and those for pedestrians. Rates per 100,000 capita were calculated using population figures which IRTAD supplies based on OECD data. The selected time period ensures that all variables, including the control variables, are available for all countries.

The time-invariant country-specific variables describe the insurance systems in the countries as discussed in the section above on institutional arrangements. A dummy-variable denotes whether the country has some sort of no-fault auto insurance system, including a combination of different insurance systems. Appraising the institutional arrangements, this is the case for Australia, Canada, Israel, New Zealand, Sweden, and the United States. The Canadian provinces with no-fault insurance make up about 80 percent of the population. The Australian population under no-fault systems is between 30 percent and 60 percent, depending on whether New South Wales with the no-fault insurance for catastrophic injuries is considered a no-fault state. The United States have roughly 35 percent of the population in jurisdictions with no-fault, choice, or compulsory add-on systems.

A second dummy-variable is used to identify countries possessing a relative high degree of regulatory influence in premium setting. These are countries that predominantly do not base insurance premiums on individual risks, such as motorists' accident histories. Rather, considerations of social welfare, like affordability of insurance rates, play a crucial role for governmental intervention. The publicly run no-fault insurance schemes qualify by definition for such a classification. Among the countries with private insurances, several jurisdictions restrict premiums for auto insurances as well (Zimolo, 2010, pp. 38, 84). Bonus and malus rules are generally possible and rates may be adjusted to individual motorists' risks. Public intervention

such as prior approval of rates, however, tends to limit the extent of variations of rates in accordance to the accident history. Limited rate variations effectively result in low risk drivers subsidizing high risk drivers, and consequently in an increase in moral hazard.

According to the findings in the discussion on institutional arrangements, restrictions on individual rating is relatively strong in Australia, Canada, Japan, New Zealand, South Korea, and the United States. In Australia, only insurances in New South Wales may in real terms include experience rating, but even there the government influences premiums based on social policy objectives such as affordability; surcharges to or discounts from the base rates are quite limited compared to the European Union states (Zimolo, 2010, pp. 87-88). Rate regulation in the United States has been as much discussed as no-fault insurances (Grace et al., 2013). Several states have quite a strict regulation of automobile insurance rates with prior approval requirements (Hunter et al., 2013, pp. 7-8). In Canada, regulatory influence in premium setting is comparably high. Not only the states with public no-fault systems, but also Ontario and Alberta distinctly intervene in the premium setting of the insurance industry (Kelly and Li, 2008). An overview of the time-invariant variables is provided in Table 1.

Table 1   Country-specific time-invariant indicators

Countries with a predominant no-fault system	Countries exhibiting regulatory control in insurance rates
Australia, Canada, Israel, New Zealand, Sweden, United States	Australia, Canada, Japan, New Zealand, South Korea, United States

It has been shown that *population density* affects the likelihood of fatal accidents (Clark and Cushing, 2004). The higher the population density, the more likely someone is involved in an accident (Hayakawa et al., 2000, p. 833). If population density increases to a certain point, however, drivers become aware of the increased risk of accidents, and can be expected to drive more carefully. For example, drivers on rural highways will not expect pedestrians crossing the road to the same extent as in cities. Further, population density may act as a proxy for the availability of health care, or the proximity of hospitals. The farther away an accident occurs from a hospital, the more likely injuries are fatal. The population density

variable is expressed as population per thousand square-kilometres of landmass. The population data are contained in the IRTAD/OECD dataset. The land areas of countries are extracted from the Worldbank's database World Development Indicators.[152] The findings in previous literature suggest using the logarithm of population density to improve the precision of regression estimates (Clark and Cushing, 2004).

Multiple studies show that the *drivers' age and gender* is a strong determinant for the probability of accidents. Especially young male drivers are associated with higher accident rates. As an approximation, the proportion of males between 15 and 24 as percentage of the overall population is used, assuming that a similar proportion can be found amongst young male drivers and pedestrians. The data are obtained from the OECD population dataset.[153]

Alcohol consumption has an impact on traffic safety. Most traffic laws allow for a maximum amount of alcohol blood content while driving motor vehicles. As alcohol inhibits mental reaction abilities for both injurers and victims, higher accident rates can be expected when more alcohol is consumed in a society. Alcohol consumption measured as the annual consumption of pure alcohol in litres, per person, aged 15 years old and over is taken from the OECD dataset "Non-Medical Determinants of Health".[154]

Income may determine accident rates in ambivalent ways. Richer countries can afford newer and safer cars. People with higher income are likely to drive larger and more expensive cars, and may drive more carefully in order to protect their property. On the other hand, safer cars might induce drivers to be less careful as they know that seat belts, airbags, and so on will protect them better in case of an accident (Peltzman, 1975). Also, wealthier persons might just not care so much about property losses as they can more easily afford to replace property, pay damages or higher insurance premiums. The income data included in the regression are taken from the OECD National Accounts, represented as annual net income per head at current US dollar purchasing power parities.[155]

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[152] Available at http://wdi.worldbank.org/table/3.1
[153] Available at http://stats.oecd.org/Index.aspx?DataSetCode=POP_FIVE_HIST
[154] Available at http://stats.oecd.org/index.aspx?queryid=30126
[155] Available at http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE2

Education may be important since better educated people may make more rational decisions about driving and vehicle ownership (by appreciating such factors as safety versus speed). The proportion of the 25-64 year old population that attained a tertiary education degree is obtained from Chapter A of the OECD dataset "Education at a Glance".[156]

Table 2   Descriptive Statistics for Time-Varying Variables of IRTAD Countries for the period of 2005-2010

Variable	Mean	Std. Dev.	Minimum	Maximum
Overall Fatality Rate (Deaths per 100,000 population)	7.98	3.10	2.52	14.96
Pedestrian Fatality Rate (Deaths per 100,000 population)	1.44	1.03	0.00	5.28
Population Density (Capita per 1,000 sq km landmass)	15.06	13.72	0.27	49.50
Young Male Proportion (Percentage of Male aged 15-24)	6.53	0.72	5.04	8.33
Alcohol Consumption (Pure alcohol in litres per capita)	9.74	2.30	2.20	13.40
Income (Net income per head, US$ PPP)	28,946.70	8,509.15	11,734.95	58,816.60
Education (Proportion of 24-64 y/o with tertiary education)	30.08	9.23	12.22	50.59

Observations for 29 countries in 6 years (N=174)

Table 2 summarizes descriptive statistics for the control variables. The variables show wide variations among the 29 countries. Given the likely influence on road safety, controlling for these variables is important as they can be expected to explain much of the differences in death rates.

This study does not take certain variables into account that are often to affect accident rates. Some studies estimate speed violations and other traffic offences in order to account for increases of accident risks due to reckless driving. This however overlaps with the outcomes being explained here. (Both include the effects of careless driving.) Speeding and other traffic violations are reckless behaviour that may be encouraged by the liability regime. Thus, the accident rates already capture reckless driving in form of traffic violations. If no-fault regimes increase faulty

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[156] Available at http://stats.oecd.org/Index.aspx?DataSetCode=CHAPTER_A_EAG2014_BACKUP

behaviour, this will include traffic law violations and be expressed in higher accident rates. In addition, the number of traffic offences depends on the degree of enforcement of traffic laws which is difficult to measure. Further, endogeneity may exist since states may respond to higher accident rates with increased traffic controls.

In addition, weather conditions are often considered as they may have an impact on road safety, but are excluded here. Although one might expect that snow and ice increase the likelihood of accidents, countries in warmer regions as in the south of Europe are actually associated with higher accident rates. This indicates that motorists may adapt to weather conditions that can be expected to occur each year. People in colder regions prepare for the likely snowfall in winter and use winter tyres, for example. Also, weather conditions are hard to determine and often not very meaningful on a country-wide basis. Especially the larger countries, like the United States and Australia, have very diverse weather patterns among their individual regions. Therefore, the weather conditions are treated as part of the unobserved random country effects.

7   Results

The results of the regression analyses are presented in Table 3. With respect to overall fatality rates, the control variables exhibit the expected correlations. The nonlinear relationship between fatality rates and population density is negative and statistically significant, implying that lower populated countries have a slightly higher risk of fatal motor vehicle accidents since the next hospital may, on average, be farther away from a crash site. The risk of fatal accidents also increases significantly with higher proportions of young males in the population. Similarly, more consumption of alcohol in the population is considerably and significantly correlated with an increased accident risk. Higher achievement in education makes the roads of a country safer, but with a smaller impact than the previous factors. Income shows a negative correlation with accident rates as well, but with a marginal and not statistically significant effect. This was predicted due to the ambivalent nature of income levels: a country's motorists can afford safer cars, but are simultaneously less concerned about the financial effects of accidents. Also some control factors are correlated so that the estimates of their coefficients and standard errors must be treated with caution. Specifically, income correlates strongly with

education. This multicollinearity is of no concern here, as the factors are not of primary interest.

Table 3 Estimates of Random Effects Model Regression

	Overall Fatality Rates		Pedestrian Fatality Rates	
Intercept	2.685		-2.608	*
	(5.887)		(1.365)	
Logarithm of Population Density	-22.559	***	0.803	
	(8.770)		(2.027)	
Rate of Young Males	1.834	***	0.451	***
	(0.684)		(0.103)	
Alcohol Consumption Rate	0.820	***	0.178	**
	(0.248)		(0.046)	
Education Level	-0.151	**	-0.055	***
	(0.068)		(0.015)	
Income	-0.00006		-0.00002	
	(0.00005)		(0.00001)	
Means of Variables				
Log. of Population Density Mean	22.874	***	-0.524	
	(8.891)		(2.038)	
Mean Rate of Young Males	-0.190		0.477	***
	(0.854)		(0.183)	
Mean Alcohol Consumption Rate	-0.757	***	-0.167	**
	(0.296)		(0.069)	
Mean Education Level	-0.084		0.003	
	(0.102)		(0.019)	
Mean Income	0.00005		0.000002	
	(0.00009)		(0.00002)	
Insurance System Variables				
No-Fault Dummy (yes)	-0.674		-1.211	**
	(1.161)		(0.506)	
Rate-Restriction Dummy (yes)	4.437	***	1.639	***
	(1.127)		(0.337)	
Sigma u	2.263		0.583	
Sigma e	0.874		0.256	
Rho	0.870		0.839	
R-squared within	0.642		0.394	
R-squared between	0.529		0.742	
R-squared overall	0.549		0.713	

Number of observations: 174 (29 countries in 6 years)
Robust standard errors are shown in parentheses with 1%, 5% and 10% significance level denoted by ***, ** and *, respectively.

Turning to pedestrian fatality rates, some changes in the behaviour of the control variables can be observed. Population density loses its significance. Accidents involving pedestrians mostly occur within built-up areas where hospitals are usually close-by. The country-wide population density does not matter that much as cities in the country sample presumably have similar population densities and hospital infrastructure. The rate of young males and education still have some measurable impact, but to a lesser degree than for the overall fatality rates. Alcohol consumption is also less important and less statistically significant, indicating that the detrimental effect of drink driving is more noticeable when higher speed is involved and cars may collide with each other.

The variables of interest, the dummies for no-fault and for rate regulation, differ in significance and impact between the overall fatality rates and pedestrian fatalities. The no-fault variable has no significant effect when tested in connection with overall fatality rates. The negative correlation becomes statistically significant for the estimation of pedestrian fatality rates. Regulatory restrictions on insurance rates have a substantial and significant impact under both specifications.

8   Discussion

The framework for insurance systems predicted that no-fault insurance as such has not much impact on accidents. This is confirmed by the empirical analysis of the IRTAD data, which in this respect coincides with the results of the more recent literature. That motorists will be compensated for their personal injuries regardless of their fault in an accident, does not noticeably increase their moral hazard in regard to other motorists. Compensation for bodily injuries as such is hardly ever complete since no amount of money can make up for the loss of limb or life. In addition, no-fault insurance frequently excludes compensation for pain and suffering, especially in the public systems. Because careless motorists endanger their property as well, first-party no-fault insurance does not reduce the incentive to take care even for minor accidents. The costs for car repairs are typically not covered by the no-fault system and substantial enough to induce motorists to drive carefully.[157] The risk of property damage can be insured voluntarily in all countries, but such insurance keeps

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[157] Only the no-fault system of the state of Michigan partially covers property damages (Loughran, 2001, p. 5). Moving cars in a collision are not insured, though. Car owners can sue the at-fault driver for up to US$ 1,000 of damages to their car unless they are 50% or more at fault ('mini-tort'), Michigan Insurance Code of 1956, MCL 500.3121, 3123, and 3135.

incentives to take care intact with experience rating and deductibles. As tort is not excluded for those losses, the determination of fault still matters.

In contrast, the moral hazard created by restrictions for the setting of premiums is substantial. Public no-fault insurances such as those of Australia, Canada, or New Zealand, only demand flat-rate contributions that do not differ for high-risk motorists. Likewise, state regulation can undermine the rate finding mechanisms that normally would exist in unregulated private markets and would ensure incentives for careful driving. Experience rating, for example, has less impact in regulated than in unregulated countries. As a result, motorists are less careful vis-a-vis other traffic participants. (The moral hazard effect, however, is not only detectable in relation to pedestrians, but also increases careless driving in general.)

Restricted insurance premiums do not sufficiently reflect the level of care taken, and thus the tortfeasor's responsibility for damages of other parties does not have the deterrent effect that exists when premiums rise substantially after a faulty accident. The social welfare consideration of affordability comes with social costs that are externalised from the individual motorist to the group of traffic participants. Motorists with higher risk tolerance choose an inefficiently high activity level, while the more careful drivers choose inefficiently low levels of driving in lieu of the higher accident risk. The restraints from property damages on driving behaviour are limited in case victims are pedestrians, or the driver's car has a low value in relation to the driver's wealth.

That no-fault systems are negatively correlated with pedestrian accidents (albeit with weak probability) might seem to contradict the framework, but has to be seen in the context of rate setting mechanisms. No-fault jurisdictions that implement flat-rate premiums will still experience higher accident rates. The no-fault component is not the essential point. No-fault states with private insurances and risk-specific premiums might see lower accident rates since such systems are comparable to strict liability. The motorist is liable for collisions regardless of fault and will notice an increase in insurance payments. This induces motorists to take care although the insurance system is termed no-fault. The divergent findings in the literature might partly be explained by this connection. Further, it has to be born in mind that some countries that are classified as having a no-fault system in fact have mixed systems which can affect the result.

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Another interesting point in this regard is that pedestrians do not seem to take less care under no-fault insurance. The victim's level of care could presumably be said to decrease under a no-fault insurance because even the negligent victim receives compensation (in contrast to traditional tort law). This idea can be refuted as no-fault insurance is not correlated with an increase in pedestrian accidents. Victims, and especially pedestrians, do not seem to act on financial incentives as they are likely to be substantially injured in a car accident. Severe bodily injuries cannot really be compensated, and pain and suffering is often excluded by no-fault systems. If at all, pedestrians take more care in systems that create moral hazard of drivers in order to compensate for the more dangerous environment.

Some reservations exist with the results of this analysis. The estimations assume that unobserved country effects do not coincide with the choice of insurance system, that is, endogeneity does not exist. If all no-fault states were for example to employ more effective traffic safety policies than other states, the observed fatality rates would likely be lower regardless of moral hazard effects. Australia has very thorough drink driving law enforcement (Lindo et al., 2014). But nothing indicates that this is true for all other no-fault countries. As another example, Sweden follows a "vision zero" policy that seeks to eliminate all traffic fatalities.[158] The country makes great effort to improve safety on roads, and places a lot of attention on the design of roads, such as safer pedestrian crossings and metal barriers that separate bicycle lanes from cars. Such strategies cannot be observed to a similar degree in other no-fault countries like New Zealand or Australia, but do exist for instance in the Netherlands with its "Duurzaam Veilig" (sustainable safety) policy.[159]

Cultural and psychological characteristics might be further explanations for differences in accident rates. The attitude towards risk taking and the perception of danger in a society can have an effect on the behaviour of drivers and accident frequencies (Haykawa et al., 2000). These differences should be captured by the random effect model, but it cannot be excluded that driving culture and insurance systems are correlated. For example, a more altruistic society that is concerned about distributional equality, fairness and collective welfare might be more likely to

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[158] See http://www.visionzeroinitiative.com/en/Concept/. Similar concepts exist in New York City, see http://www.nyc.gov/html/visionzero/pages/home/home.html, and in San Francisco, see http://sfmta.com/projects-planning/projects/vision-zero.

[159] See http://www.doormetduurzaamveilig.nl/index_uk.htm.

introduce no-fault insurance, and simultaneously exhibit more careful driving. The negative correlation of no-fault system and accident rates might support such a finding, but the positive correlation with restrictions on rates, that are an expression of equality, suggest otherwise.

Another psychological question is whether drivers react to financial incentives at all (Dewees et al., 1996, pp. 20-21). Accidents are random events that are often out of control of the persons involved. Drivers will not respond to insurance incentives if they are not able to make conscious decisions about the financial impact of their behaviour in the moment of driving. Other factors such as the current traffic situation, stress, or tiredness may be much more influential on the driver's behaviour. Though it is not likely to see an impact of insurance regimes on an individual level, attitudes towards risk taking and perceptions about financial consequences should be measurable on an aggregate, societal level. Fines for traffic offences such as speeding or drink driving have certainly an effect on driving behaviour, and are felt only with a delay as well. That persons might not be fully informed about all the consequences of an at-fault accident does not necessarily weaken the connection between insurance system and safety levels. The society as a whole learns over time how much effort is required to minimize accident losses. The insurance regime will be felt in both care levels and driving frequency.

A further potential issue is causality. Countries with high fatality rates could have introduced systems that generate moral hazard. Although this would be an illogical policy, it cannot be excluded that this happened for some reason. As such, the causal connection between fatality rates and insurance system cannot be established from this analysis with certainty. Given the analytical framework, it is still a more convincing explanation to assume that moral hazard prone systems lead to increased risk than the other way around.

Moreover, the dummy variables used to denote the insurance system result in rather crude estimates. The effect of no-fault depends very much on the other features of the insurance system, and is expressed to various degrees in countries with a mix of systems. The compensation levels differ widely, not only between no-fault and tort law systems, but also between countries with the same regime (Porrini, 2014, p. 554). Similarly, the restrictions on rate setting differ even among the countries with a high level of regulation. More precise degrees of rate variations

could measure how much more a motorist may have to pay in case of a faulty accident. Also, it would be preferable to link the fatality rates to the various jurisdictions with their different regimes, instead of entire countries. Limited availability of data does not allow for such precision, though. Future research may be able to collect more information from various sources.

9   Conclusion

The empirical analysis of total fatality rates and pedestrian fatality rates of 29 countries reveals that some motor vehicle insurance systems indeed increase moral hazard. No-fault systems as such do not cause drivers to take less care. Restrictions on experience rating, however, lower the level of care taken by motorists. No-fault insurance has a detrimental effect on the safety of roads when it is combined with flat-rate premiums, as found in New Zealand or the Northern Territory in Australia.

The novel approach of comparing pedestrian fatalities and overall traffic death rates reveals the distinction of first-party and third-party effects of no-fault rules and insurance regulation. No-fault insurance does not have an effect on overall rates, and states with no-fault even have lower pedestrian fatality rates. Taking inflexibility in rate setting into account, states that restrict insurance premiums show higher rates under both specifications. The incentive to take care seems not to be negatively affected by no-fault rules, but by moral hazard due to limited experience rating. The reduced pedestrian fatality rate may be explained with increased incentives of victims to take care, which stems from limited compensation that is common in no-fault regimes. Also in some countries, like Sweden, no-fault in practical terms amounts to strict liability in respect to pedestrian accidents because the motorists' insurance premium increases regardless of the proof of negligence.

As a result, the distinction of no-fault versus tort-based third-party liability regimes is not very meaningful for analysing the effects of insurance rules on accident rates. Rather, the specific mechanisms of insurance premiums are decisive for road safety. Admittedly, no-fault systems are often associated with weak incentives to take care, which is especially true for public pure no-fault schemes. However, given the diversity of no-fault regimes, this connection is only valid for a subset of no-fault arrangements.

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Appendix A   Mean Values of Time-Varying Variables for 2005-2010 per Country

Country	Fatality Rate	Pedestrian Rate	Population Density	Rate of Male 15-24 y/o	Alcohol	Education	Income
Australia	7.14	0.95	0.28	7.14	10.58	34.84	31,017.64
Austria	8.15	1.24	10.06	6.24	12.57	18.22	31,816.36
Belgium	9.35	1.01	35.12	6.13	10.57	32.59	30,135.12
Canada	7.79	1.02	0.36	6.99	8.08	48.32	31,801.99
Czech Republic	10.24	2.12	13.40	6.62	11.93	14.52	18,636.02
Denmark	6.12	0.99	12.89	5.97	11.38	32.71	32,067.94
Finland	6.27	0.82	1.74	6.34	10.10	36.35	29,790.47
France	7.32	0.88	11.31	6.38	12.48	27.18	29,106.16
Germany	5.61	0.77	23.56	5.89	11.47	25.19	30,633.24
Greece	13.70	2.06	8.68	6.09	8.67	23.00	23,395.23
Hungary	10.56	2.49	11.22	6.48	12.15	18.66	15,316.55
Iceland	5.55	0.54	0.31	7.50	7.07	31.16	27,114.70
Ireland	7.10	1.40	6.28	7.14	12.47	33.26	31,395.40
Israel	5.30	1.70	33.61	8.12	2.42	44.95	22,147.50
Italy	8.35	1.15	20.19	5.23	6.87	13.72	26,367.98
Japan	5.18	1.71	35.05	5.36	7.72	42.14	26,406.85
Korea	12.38	4.68	49.20	7.21	9.15	35.68	22,411.49
Luxembourg	8.76	1.32	18.57	6.04	11.65	29.16	50,756.53
Netherlands	4.11	0.42	48.61	6.15	9.53	31.33	33,948.70
New Zealand	9.21	0.85	1.61	7.36	9.37	39.73	22,673.02
Norway	4.85	0.61	1.55	6.47	6.60	34.96	48,173.70
Poland	13.19	4.41	12.53	7.81	10.05	19.51	14,621.64
Portugal	10.02	1.75	11.58	5.87	11.33	14.07	19,143.13
Slovenia	11.07	1.61	10.01	6.35	10.88	22.24	22,009.48
Spain	7.74	1.24	8.96	5.75	10.82	29.21	25,942.53
Sweden	4.33	0.52	2.23	6.62	7.00	31.78	33,210.85
Switzerland	4.84	0.92	18.94	6.05	10.17	32.29	37,499.20
United Kingdom	4.50	0.97	25.45	6.72	10.78	34.97	31,847.81
United States	12.79	1.50	3.30	7.32	8.63	40.46	40,067.01

Appendix B Correlation matrix of control variables

	Alcohol	Population Density	Education	Young Male Proportion	Income
Alcohol	1.000	-0.113	-0.462	-0.272	-0.044
Population Density		1.000	0.065	-0.170	-0.088
Education			1.000	0.341	0.366
Young Male Proportion				1.000	-0.177
Income					1.000

Chapter 4 – Deterrence from Regulation and Criminal Sanctions

Abstract

This chapter builds on the finding of the second chapter that the exclusion of tort law for workplace injuries results in higher accident rates. The question arises whether health and safety regulation can counteract the detrimental effect by providing deterrence from criminal sanctions. This is particularly relevant for New Zealand where a tendency of the law towards a reliance on regulation and criminal law can be observed. In practice, however, criminal law cannot fully replace common law, and is not as effective as private law actions in establishing incentives to take care. It would be more efficient to emphasise individualised experience rating in the levies of the public accident compensation scheme, to allow access to tort law in limited circumstances, and to include damages for pain and suffering.

1 Introduction

The previous chapters on motor vehicle insurance and workers' compensation have identified economic problems with these arrangements in some countries. The loss of deterrence from tort law results in higher accident rates that likely reduce overall welfare. While the previous chapters have focussed on New Zealand's place within an international comparison, the following section highlights recent developments that are specific to New Zealand. This chapter provides more background to the comprehensive accident compensation scheme in New Zealand. It discusses how legislation and judiciary adjust for the loss of safety incentives that arise from the absence of tort law. This is illustrated with workplace health and safety regulation. It finds a tendency to rely on regulation and criminal sanctions for non-compliance. This might be interpreted as an instrument of the law to substitute for the missing deterrence from tort. The chapter evaluates whether New Zealand's approach is effective and regulation can replace tort law in providing incentives to take care.

New Zealand's comprehensive accident compensation system was established about forty years ago. It is unique as it covers all accidents on a no-fault basis, regardless of the occasion or the cause. The scheme is run by the government owned entity Accident Compensation Corporation (ACC). Everyone is automatically insured for personal injuries from accidents taking place in the New Zealand jurisdiction. Not only are personal injuries arising from work accidents covered, as are injuries from car accidents, but also accidents from any activity both during work and leisure. On the other hand, the right to sue anyone for damages of personal injuries has been limited. Common law actions for personal injuries such as torts are practically excluded, apart from rare instances such as punitive damages (Cheer, 1995).

In relation to work-related accidents, no-fault compensation systems are much more common throughout the world. Many countries have introduced no-fault workers' compensation schemes during the turn of the 20th century in course of the industrial revolution. The common rationale for no-fault compensation is the perception that many injuries will not be compensated by the means of private law actions because no one is at fault, or negligence cannot be proven. Also the costs of legal actions are seen as a barrier to receiving compensation. Under-compensation can pose a problem to society when large parts of the population are affected and cannot cover their living costs, for example due to loss of the ability to work. As a consequence, liability for compensation has been moved from the private to the public realm. Workplace injuries are compensated by a social insurance[160] regardless of fault, and employers are obliged to contribute insurance premiums. In return, employers are relieved from private law liability.[161]

The security of compensation in no-fault schemes comes with a downside. As neither employers nor workers are liable for accidents, their incentives to take care can be expected to be significantly reduced. For New Zealand, it has been noted that accident rates are relatively high compared to similar countries (Gunby, 2011). The recent Pike River Coal Mine tragedy has raised public awareness of the question how safe New Zealand's workplaces are. In 2010, a methane explosion caused the death

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[160] The participation in the insurance system is obligatory for a defined population, and the benefits are prescribed by public law. Social insurance often is a government-run entity with own funds. In some jurisdictions, workers' compensation is underwritten by private insurers.

[161] For a more detailed analysis, see Chapter 2.

of 29 workers in a mine on New Zealand's south island. Subsequent investigations found insufficient supervision of the workers, non-observance of occupational health and safety regulation, and inadequate controls by the government (Royal Commission, 2012). However, the question as to whether a system with stronger emphasis on personal liability would produce better incentives for ensuring that efficient work safety standards are met, has not been discussed. This chapter seeks to close this gap by contrasting the deterrence effects of tort law liability with those from regulation.

The remainder of this chapter is organised as follows. First, the background and rationale of New Zealand's accident compensation scheme is presented, and some literature evaluating the scheme is summarized. Second, the role of tort law for providing incentives to take care is briefly described. Third, moral hazard stemming from the exclusion of private law liability is identified. This part briefly recaps the findings of the previous chapters, and adds thoughts on moral hazard of governments as another dimension. Fourth, given the reduced incentives to take care, it is evaluated whether deterrence from criminal law effectively substitutes for the missing deterrence effects of tort law in New Zealand. It is shown that there are tendencies towards such substitution in practice, but also that the substitution is far from complete. Fifth, the overall effectiveness of health and safety regulation as a means to provide safety incentives is assessed. The result that health and safety rules are not very effective in practice confirms the finding that regulation and criminal sanctions do not sufficiently restore missing incentives from tort law. The sixth part presents alternative measures that are currently considered, specifically enhanced experience rating in levies for the accident compensation scheme.

2   Rationale for New Zealand's No-Fault Compensation Scheme

New Zealand's compensation scheme came into effect in 1974. At that time there was a strong belief that the then existing compensation scheme for workers in New Zealand was not functioning well. A Royal Commission was established to look into ways to remedy the problem, and presented a lengthy report which frequently is referred to as the Woodhouse report, named after the Commission's chairman. The report concluded that the best way forward was to establish a comprehensive compensation scheme.

The economic argumentation in the Woodhouse report was rather sparse. The main reasoning that led to the accident compensation scheme was based on social justice and moral considerations. The report found that for practical reasons a large proportion of injured persons did not receive the full amount of compensation, which they would have been entitled to. Many cases were settled resulting in low damages payments, or were unsuccessful in court because negligence of the other part could not be proven. The outcome of a damages action was a matter of randomness, no one was able to predict with any certainty whether a claim would be successful (Royal Commission, 1967, pp. 48, 52-53). The fact that the majority of claims were settled with insurance companies out of court, was seen as compromising claimants' rights (pp. 47, 55). Whether the practice of settlements may have been efficient and had provided effective compensation, was not discussed.

The report contained some references to incentives and deterrence. It acknowledged that common law actions are generally seen as setting the right incentives for persons to take care. But it refused to accept the validity of this argument (p. 51). Compulsory insurances would reduce these financial effects as the losses are widely shared (instruments of insurers to mitigate moral hazard were not evaluated). For workplace injuries, the report claimed that the expensive disruption in the pattern of work would in itself constitute enough incentive to avoid accidents. Further, the authors could not find any empirical evidence supporting the deterrence effect of common law actions.

A further implicit economic consideration was that of social cost (Gaskins, 2010). The report estimated that only a fraction of the amounts paid into the common law system is finally received by plaintiffs, the rest of up to two-thirds is swallowed up for various administrative and legal charges (Royal Commission, 1967, p. 59). Comparing the situation to the Canadian system, the report observed that the comprehensive Ontario workmen's compensation scheme only needed one-fourth of the administrative expenses of the insurance companies in New Zealand (p. 59). Furthermore, the common law system entailed long delays, which added to the financial losses of the injured litigant (p. 57). The duration of court proceedings was long, and settlements were frequently made only at the door of the court room. In sum, the common law system was seen as generating wasteful expenses for the parties concerned. The report assumed that these expenses could be avoided in a

different compensation setting. The no-fault rule would exclude litigation over the negligence of either party, and therefore promise a more cost-efficient process of compensation. However, the efficiency effects of negligence rules and alternatives such as strict liability were not discussed in the report. Social cost includes more than administration and litigation cost. The report missed an assessment of the overall welfare effects, in particular of the optimal level of precaution. In certain settings a liability rule could be the most efficient instrument, providing for the right incentives to take care and to determine compensation, although it generates litigation cost and uncertainty.[162] The behaviour of both parties of a potential accident, the injurer and the victim, influence the likelihood of an accident. The compensation regime must address this reciprocal nature. Efficient compensation of the victim is important, but cannot be the only goal (Trebilcock, 1989, p. 36).

A major aspect of the report's argumentation was that accidents are often not the responsibility of individuals but of the society as a whole. To a large degree accidents were caused more by the complicated and uneasy environment of modern life than by human error. In the view of the report, the risk of injury was due to social progress (Royal Commission, 1967, p. 51). As a result, compensation was seen as the wider responsibility of the entire community. Accident compensation was hence regarded as an issue of social insurance. This argument could also be seen as relating to the deterrence effect. If in fact the modern environment was inherently unsafe and accidents could not be avoided by individuals, then they could not be deterred by common law liability. If no one can sufficiently control accident risks, incentives will not work.

The accident compensation scheme has been analysed and evaluated by various authors. Most find that it has been working well. Criticism primarily relates to the funding and administration of the scheme and the absence of competition, which could enhance efficiency (see e.g. Wilkinson, 2003; Evans and Quigley, 2003).

Palmer (1979) observes that the Woodhouse Report has failed to assess common law in a balanced way and has said little about its advantages (p. 31). However, he does not express that this would invalidate the credibility of the scheme.

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[162] As Coase (1960, p. 34) states, "the problem is to devise practical arrangements which will correct defects in one part of the system without causing more serious harm in other parts."

Deterrence and methods of internalizing costs could be implemented outside the compensation scheme (p. 379). Also Brown (1985) finds that deterrence should not be the main factor in deciding about replacing tort law with no-fault compensation. According to him, incentives to take care could be achieved likewise with criminal sanctions, administrative control, or through experience rating (p. 979). On the other hand, Wilkinson (2003) remarks that the argument for the comprehensive compensation scheme confused an insurance system with a liability system. The fault principle of tort law would generate incentives to avoid future accidents, while insurance could provide relief to victims regardless of fault.

Gaskins (2010) is especially fond of the report's "creative vision for personal injury" and its consideration of social costs. The acknowledgement of the larger "network effects" of personal injury is regarded as a prescient insight paralleling the thinking of institutional economics. As noted above, the one-sided focus on the compensation of accident victims is, however, one of the weaknesses of the Woodhouse Report. In claiming that accidents have wider societal implications, accidents are seen as a matter of social obligation, detached from the behaviour of injurers and victims.

In practical terms, Todd (2011) finds the accident compensation scheme has been a "distinct success" (p. 218). Comparing it to the tort system, he regards the scheme to work effectively and to compensate quite generously with the minimum of formality. Without reference to concrete figures, he believes that the levies compare favourably with premiums for private insurances against tort liabilities.

Criticism was repeatedly expressed in respect to the different treatment of injuries from accidents and non-occupational diseases.[163] As a result, individuals suffering from an accident through their own fault will likely be better compensated than someone who suffers from a disease for which no one could be blamed (Pfennigstorf, 1981, p. 1163). The distinction between injuries and diseases poses difficulties and can result in delays and litigation, especially in the context of work-related diseases that evolve gradually, such as asbestos exposure or chronic pain syndrome (Bull, 2014). Thus, some authors advocate the extension of the system to include diseases (Palmer, 1979). This would also overcome incentives for claiming

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[163] The Woodhouse Report acknowledged the argument that diseases should be included, but saw it outside the scope of the report; and further statistics were needed to take firm decisions (p. 114).

accident benefits for diseases. Such moral hazard has been found by Evans and Quigley (2003). They argue that employees have an incentive to claim injuries as accidents since the accident compensation scheme provides them with greater benefits than the New Zealand health system. In addition, health providers began to report relatively more accidents after a change from block funding to funding per accident around the year 1992. The result was a dramatic increase of reported non-fatal injuries between 1992 and 1994, while fatal accidents remained in their previous trend. The change in purchasing arrangements of ACC had increased ex post moral hazard of health providers and incentivized them to report injuries as being caused by accidents.

The assessment of the overall cost benefits of the no-fault system is still undecided. In theory, costs for litigation and complex appraisals of fault can substantially be reduced compared to a tort system (Wagner, 2012a, p. 30). Although the cost benefits are one of the main arguments in favour of no-fault systems, few empirical estimates of the cost effects have been conducted. In the context of medical malpractice, Bismark and Paterson (2006) find that the New Zealand system has been very cost-effective. Administrative and legal cost amount to 10 percent of ACC's expenditures, while malpractice systems of other countries absorb 50-60 percent. Similarly, Dewees et al. (1996, p. 146) conclude that no-fault plans in New Zealand and in Sweden have been successful "in compensating most injured patients promptly and at relatively low administrative cost." Also Mello et al. (2011, p. 7) establish lower administrative cost for no-fault insurance for medical malpractice in Sweden, Denmark, and New Zealand; the overhead costs amount to around 17 percent of the total cost of the system, compared to 55-60 percent in the U.S. The authors note that in the no-fault countries the average total award size is much lower than in the U.S.: in 2009, the average compensation per paid medical malpractice claim was around US$ 4,450 in New Zealand, US$ 20,000 in Sweden, US$ 40,000 in Denmark, and US$ 324,000 in the U.S. Regarding a no-fault scheme in Florida for birth-related neurological injuries, Bovbjerg et al. (1997, pp. 93-94, 104) show much lower administrative costs for this scheme compared to tort systems. Again due to legal expenses, the Florida scheme produces only 10 percent administrative costs to total cost, compared to 50 percent for comparable tort cases. Comparing no-fault systems with tort systems in Australia and New Zealand, Luntz (2004) finds that

premiums for both auto insurances and workers' compensation are much lower under no-fault systems. Especially, ACC's rates compare favourably. Luntz concludes that the common law system is "horrendously expensive" mainly because of the litigation costs involved.

In contrast, Devenay (2009, p. 8) points out that the New Zealand comprehensive no-fault scheme has proved expensive to run. The author finds a "dramatic rise" of claim costs, and unintended side-effects of the scheme such as "pressure on the government to increase substantially other income maintenance programs."

The issue with such cost comparisons is that they only provide a partial picture. For a complete assessment, the overall costs for society need to be determined, not only the costs of the insurance scheme. No-fault compensation schemes may externalize some of the costs to victims since they substantially pay out less compensation than the tort system. Further, missing deterrence effects have to be taken into account. Costs for accidents avoided have to be considered in favour of tort systems (cf. Cane, 2003, p. 674). Therefore, this paper does not concern itself with difficult cost estimations, but rather focuses on deterrence effects and indirect additional expenses from regulation and criminal sanctions as a more meaningful appraisal of social cost effects.

Since its inception, the accident compensation scheme has been reviewed several times. Most of the changes in law relate to the funding or the coverage (an overview is provided by Todd, 2011). One of the recent amendments was the reintroduction of experience rating for work levies based on a business's claims history, which became effective in 2011. Before, the New Zealand government had initiated a "stocktake of ACC accounts". The focus was on the financing of the scheme because net liability had increased and consequently the levies for funding the scheme (Steering Group, 2010, p. 3).[164] A major issue was whether competition

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[164] At the outset, the accident compensation scheme was fully funded, but since the early 1980s the scheme's levies were calculated on a pay-as-you-go basis, i.e. on basis of the current fund liabilities, in order to release the accumulated fund for other government purposes. Since the Accident Insurance Act 1998, the accident compensation scheme is required to be fully funded again, save for the Non-Earner's Account (Todd, 2011, p. 213). In contrast to private insurers, government-run schemes can switch between funding methods. The way the public compensation schemes are funded can influence moral hazard of the insured group in a generational sense, i.e. today's society may externalize accident costs to the future; the effects of this would require further analysis that is outside the scope of this paper.

should be introduced to provide insurance more efficiently than the state monopoly of the ACC. In connection with this the question was raised to which extent experience rating and self-insurance should be allowed.

As to the effect of the compensation scheme on safety, there are few studies that point to the possible connection of safety and the exclusion of common law actions (McEwin, 2000). For example, a report by the Independent Taskforce on Workplace Health and Safety (2013) concludes that safety at work has a lower level in New Zealand compared to other countries. The report recommends that a greater weight is placed on risk- and performance rated levies in order to improve workplace safety. Poorly performing and riskier employers should pay much higher levies (p. 84). Gunby (2011) also notes that New Zealand's safety record compares poorly against other countries, and suggests that legal differences in the treatment of accidents or the compensation schemes might be an explanation. Pointing to other studies, Dewees et al. (1996) attribute higher accident rates to the low degree of risk-ratings in the New Zealand scheme (pp. 25, 434).[165]

3 Deterrence Effects from Private Law Liability

Before the effects of the exclusion of private law liability in no-fault accident compensation schemes are assessed, this section identifies the economic role of tort law liability. From an economic perspective, tort law primarily provides deterrence effects. Persons who are liable in the event of an accident are to a certain extent deterred from engaging in risky behaviour. Expressed positively, individuals have incentives to take optimal care because of the prospect to be held liable for the loss their actions may cause.

Accident losses are either born by the injurer or the victim, or both. Tort law seeks a distribution of liability that maximizes welfare. Welfare is maximized when the overall costs of accidents for society are minimized, that is, the sum of expected accident loss, cost of care, and cost of administering the liability regime (Calabresi, 1968). Costs of accidents are reduced by lowering the likelihood of accidents with increased precaution or conversely by reducing precaution cost. The optimal point of precaution lies where an increase in precaution does not reduce the likelihood of

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[165] Chapters 2 and 3 provide empirical evidence that New Zealand's safety record is poor compared to other countries. They establish that a connection between no-fault compensation and safety incentives may exist, which depends on the way compensation schemes mitigate moral hazard.

accidents to such an extent that the additional cost of precaution at least outweighs the additional benefit from the lower accident risk.

3.1 Incentives Under Strict Liability and Negligence

Deterrence effects of potential injurers are similar for both variants of liability, namely strict liability and negligence. Under both arrangements, the investment in precaution depends on the expected loss from accidents. Under strict liability, the rational injurer invests in safety measures up to the point where the marginal cost of additional precaution equals the reduction in expected loss (Shavell, 1987, p. 34). The potential injurer does not invest beyond that point since the marginal cost of accident avoidance would exceed the marginal benefit of reduced accident risk. The injurer would rather take the risk than invest up front to diminish it (Posner, 1975, p. 472).

Under negligence, this optimal point of precaution does not necessarily change. In theory, courts would interpret negligence during tort proceedings in such a way that it equals the optimal point under strict liability. Courts would not require the potential injurer to incur higher cost for safety than the expected loss of an accident. As a result, injurers are not negligent if they have taken the precautionary measures that they would have taken under strict liability. Injurers have no incentive to decrease accident risks further, as they would not be liable for the residual risk under negligence.

This theoretical result depends on the practice of courts to set the negligence standard exactly equal to the optimum precaution under strict liability. This is unlikely to be achieved in practice. First, it is difficult for courts to accurately determine the optimum of strict liability because they do not have the information the injurer had. The injurer may exaggerate the cost of precautionary measures and play down the risk of accidents. Second, judges and jurors may overestimate the risk of an accident that has already happened, and therefore attribute higher expected costs of that accident in hindsight than a fully rational observer would before the accident has happened.[166] As a result, the outcome of an individual tort case will likely be suboptimal and lead to inefficiently high or low precautionary practices. However, over time one can expect that courts increase their information base by repeatedly

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[166] This potential fallacy is known as hindsight bias, see Halbersberg and Guttel (2014, p. 410).

ruling on similar cases. The standard of negligence should therefore progressively approach the optimum under strict liability.

The potential inefficiencies of negligence standards are outweighed by the risk reduction from the behaviour of potential victims in bilateral accidents.[167] Under strict liability, victims have no incentive to invest in precaution themselves if they only expect harm that can effectively be compensated. Also, they would not reduce the level of taking part in the risky activity. Any investment in risk reduction would be wasted because the accident loss is fully compensated by the injurer. This changes under negligence. Victims have an incentive to reduce accident risks, as they anticipate that a rational injurer would take due care, i.e. invest to the point where negligence is ruled out. As a result, victims cannot expect to be compensated in all accidents, and hence have an incentive to avoid accidents as well. Since victims also take optimal precautions, a negligence rule reduces the overall risk of accidents in situations in which the potential victim noticeably contributes to the risk. In contrast, if the cost of determining negligence of either part outweighs the potential risk reduction of victims, strict liability is more efficient than negligence.[168] Negligence would only add cost for finding the appropriate negligence standard, but not add sufficient benefits from victim precaution (an extreme example is the operation of a nuclear reactor).

An important element of deterrence from private law liability is that the victim receives the compensation. From a static point of view, this would not be essential as the prospect of damages incentivizes the potential injurer, but it does not matter for deterrence who receives the payment. Dynamically, though, the compensation of the victim is important because the victim has an incentive to bring a court case (Coleman, 2001, p. 187-8; Posner, 2007, p. 192). The incentive to claim damages lies with the person that has the best information about the injury and the circumstances of the accident. If a third party would receive the compensation, victims would not benefit from a claim, and hence may not bother to inform the third party about the accident in the first place. Even if the third party receives the necessary information, it may have a reduced incentive to bring all relevant claims. The cost-benefit analysis of bringing a court action is likely different for the third

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[167] In bilateral accidents both injurer and victim may contribute to the risk of accidents. An example is the workplace relationship where both employers and employees contribute to safety at work.
[168] Epstein (1996) argues with similar reasoning for strict liability in accidents involving strangers.

party than for individual victims (the third party may be thought of as the government collecting fines instead of damages).

3.2 Effects of Insurance

The optimal deterrence effects of tort law are diminished if insurance exists. Both potential injurers and victims can shift accident risks to insurers. As far as they are risk averse, insurance is generally welfare improving (Shavell, 1987, p. 190).[169] Risks are shared by the group of insured individuals, and risk-averse persons prefer to incur expenses to lower the individual risk. Absent transaction costs, insurance does not alter the level of care. Insurance premiums would perfectly reflect the level of care injurers and victims take. In reality, however, insurers do not possess accurate information about the behaviour of the insured. Premiums cannot perfectly reflect the individual risk of all insured persons, and insured individuals may partially externalize their accident cost to the group of the insured.

As a consequence, insurance creates moral hazard that increases accident risk and hence costs to society. If insurance is based on flat-rate premiums and fully compensates for the accident loss, the insured have no incentive to invest in precaution. After paying the insurance premium, any investment in risk reduction would be a cost that only benefits the insurer, not the insured individual. With a large group of insured individuals, a single incidence will not raise future premiums to such a degree that the insured is substantially motivated to avoid claims. Moral hazard from insurance therefore decreases precaution and increases activity levels. To mitigate moral hazard, insurers can compensate only partially, or demand risk-adjusted premiums based on the accident history.

Insurance has the further advantage of providing an efficient buffer to the court system. Most injury cases are settled between insurer and victim. Insurers can over time establish a comprehensive knowledge base on the insured accident risk. They know which claims are likely to be successful and quickly pay out damages accordingly. Only cases with controversial legal questions or disputed facts need to be litigated. In consequence, courts are not overrun with pointless litigation.

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[169] Insurance companies may provide further benefits regardless of the attitude towards risk; they can, for example, provide risk management services to firms (Goldberg, 2009, p. 543).

The frequency of claims allows insurers also to adjust premiums according to the risks as they develop in the market. Private insurers have an incentive to do so in order to reduce moral hazard and ultimately to cut costs (Howell et al., 2002). Information on accident risks is constantly gathered and insurers and courts can develop expertise in setting precaution standards. The information asymmetry between insurers and courts on the one side and injurers on the other is greatly reduced. As a result, the determination of the required levels of precaution can over time approach the theoretical optimal level under strict liability or negligence.

3.3   Incentives Under No-Fault Regimes

From an economic point of view, pure no-fault systems can be seen as a form of insurance that combines the effects of no liability and strict liability. The injurer is not liable for the loss from an individual occurrence of an injury. The incentive of the injurer is therefore as if no liability exists or as if third-party liability was fully insured with flat-rate premiums. The level of precaution is reduced. Victims are fully liable for their own loss, but are also insured. They behave as under strict liability of the injurer or as under full first-party insurance that does not mitigate moral hazard. They take less care than under uninsured negligence.

The difference between no-fault insurance and liability insurance is that no-fault insurance is thought of as a form of social institution. No-fault systems are therefore primarily organized with public insurers, as in New Zealand where the Crown entity ACC provides cover for accidents. The notion of a social welfare system plays a fundamental role in setting insurance premiums. Contributions to the no-fault insurance system are much more determined by equity considerations than by efficiency standards. Premiums are less likely to reflect individuals' contributions to the risk of accidents. As shown in the following section, the insurance effect is not the only form of moral hazard from no-fault regimes.

4   Moral Hazard Effects of No-fault Accident Compensation

Insurance and the exclusion of private law liability create moral hazard in multiple ways. First, the exclusion of private law liability creates moral hazard in the relationship between injurer and victim. Injurers do not internalize the full cost of their behaviour and therefore do not take as much care as they would with tort law liability. The likelihood of harm increases for victims. Second, insurance creates

moral hazard between injurer and insurer in the case of third-party insurance, or between victim and insurer in the case of first-party insurance. Insurers and victims can partly externalize their accident loss to the insurance. To a degree this is efficient as the group of risk-averse individuals benefit and overall utility increases. To restore incentives to take care and to minimize moral hazard, insurance can include experience rating, at least for negligent behaviour. Some no-fault regimes[170] base the insurance premiums on a form of experience rating. New Zealand's no-fault system failed to do so until 2011, and only introduced experience rating for workplace accident coverage to a limited extent.

No-fault compensation combines both elements of moral hazard from insurance and from reduced private law liability. These two sources of moral hazard are widely dealt with in the literature on law and economics.[171]

New Zealand's no-fault compensation establishes a third level of moral hazard, which can be found in the relationship between government and society. The government creates and enforces regulation that is directed towards safety. For example, road traffic rules set standards for safe driving. The methods, density, and diligence of traffic controls determine how effectively these rules are enforced. Similarly, occupational health and safety regulation seeks to ensure a baseline of safety at the workplace. Again, the degree of monitoring determines how likely non-compliance is detected. The extent of enforcement and the likelihood of punishment determine incentives of potential injurers to take care.

Moral hazard can occur if governmental officials have weak incentives to set effective safety standards or to enforce them. The government does not necessarily act in the interest of the principal, the society. Monitoring and enforcement of safety regulation certainly reduce accidents, but the government will focus on measures that are directed towards major risks that receive a high degree of public attention. Restrictions on budget and staff prohibit the monitoring of a large number of small impact risks. The incentives of the government hence do not necessarily align with the interest of the group of victims, and society as a whole, to reduce accident

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[170] Which exist in other countries for workers' compensation or automobile accidents, see Chapters 2 and 3.

[171] See the literature review in Chapter 2 and 3.

rates.[172] The government will likely address large-scale risks that result in few incidences with many victims. The larger number of incidences with few victims may not be in the focus of the government as they do not produce as much public attention, although their cumulative detrimental effect may be larger.[173] Tort law, in contrast, would in principle cover all instances of accidents.

Similarly, government agencies may overemphasise some risks for public choice reasons (Thomson et al., 1998, p. 134-5). Special interest groups may advocate for costly regulations that benefit them. As a result, certain risks may be reduced too much, as the benefits of risk reduction do not outweigh the costs, or regulation may impose substantial cost without achieving much.

As society is concerned with safety, high accident rates may put political pressure on the government to improve safety. An adverse public event, like the Pike River Coal Mine tragedy in New Zealand, may push the government to do something about safety at work.[174] Another example is the collapse of the viewing platform at Cave Creek that was under the responsibility of the Department of Conversation. In 1994, fourteen persons died because of the unsafe design of the platform.[175] As a consequence, criminal liability of the Crown was introduced to provide for accountability of state officials for health and safety hazards.[176] Such events are, however, rare and do not guarantee a systemic adjustment of moral hazard.[177] In contrast, a system with private insurance automatically puts financial pressure from accident costs on insurance firms. The prospect of future losses is an incentive for insurers to actively monitor employers and to seek out hazards in firms whether prescribed by regulation or not (Howell et al., 2002).

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[172] Another element is that society cannot easily observe the effort of government officers, like workplace inspectors. Further, rent-seeking by special interest groups, such as industry associations, may result in less effective regulation.

[173] In a society with a high safety attitude, the government might also focus on small-scale risks; see for example the Swedish policy to reduce road fatalities to zero, above Chapter 3.

[174] On the day the Royal Commission published its report on the Pike River Coal Mine disaster, the Labour Minister resigned, see https://en.wikipedia.org/wiki/Kate_Wilkinson_(politician). The political pressure resulted in the reform of the occupational health and safety legislation (see below).

[175] See http://www.doc.govt.nz/about-doc/news/issues/archive/cave-creek/commission-of-inquiry-cave-creek-report/.

[176] Pursuant to the Crown Organisations (Criminal Liability) Act 2002.

[177] One such case is *Creeggan v New Zealand Defence Force* [2014] DCR 244 in which the District Court Wellington granted an extension of time to file a private prosecution to the sole survivor of a helicopter crash on the 2010 ANZAC Day.

The tort system can deal with this third level of moral hazard in the relationship between society and government. Although no-fault compensation systems in many jurisdictions exclude private law liability between employer and employee, or driver and pedestrian, tort law claims are still possible with respect to third parties, including the government.[178] If a governmental official had failed to enforce safety regulation, the state could be held liable. For example, if the occupational health and safety agency conducted an inspection of a workplace and overlooked an obvious hazard, a related accident following the inspection could result in a claim against the government for damages for pain and suffering, although no-fault compensation excludes such claims against the employer. The Pike River Coal Mine disaster could perhaps have been such an instance. The Royal Commission (2012, Vol. 2, p. 204) concluded that the inspectors obtained only a "limited snapshot" of the mine's physical system and failed to issue a prohibition notice as they did not properly understand the level of compliance at the mine and had difficulties to interpret the statutory obligations of employers. As a result, the ventilation system installed in the mine was inadequate, and a second egress was not provided which the miners could have used to escape.

The New Zealand accident compensation law allows for such state liability only in exceptional circumstances when the behaviour of state officials gives rise to punitive damages.[179] This rare occasion was recognized in the case *Couch v Attorney-General*.[180] In this case, the Supreme Court held that a victim shot by a convicted murderer on parole could recover damages for injuries from the Corrections Department that was negligent in the way the parole conditions were administered. Similar issues arose after the Canterbury earthquake in 2011. The existence of building permits for earthquake prone high-rise building could potentially have provoked tort law claims based on state liability.[181] Since in New

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[178] In the United States, employees often turn to product liability and sue manufacturers of machinery or raw materials for tort damages; see Wagner (2012, p. 54) who critically observes this phenomenon.

[179] By virtue of sec. 319 Accident Compensation Act 2001.

[180] Supreme Court of New Zealand, 24 March 2010, *Couch v. Attorney-General*, [2010] NZSC 27. The injurer must have acted intentionally or with subjective recklessness.

[181] A reform of the Building Act and Chartered Professional Engineers of New Zealand Act is underway to ensure engineers have the right knowledge, skills and competence to design safe buildings, see http://tvnz.co.nz/national-news/engineers-regulation-toughened-6072348. The NZ Supreme Court generally accepts civil liability of local governments for (property) loss caused by the failure of building inspectors to carry out their duties with reasonable skill and care, see *Body Corporate No. 207624 (Spencer on Byron) v North Shore City Council* [2012] NZSC 83.

Zealand private law liability for personal harm is excluded for all accidents, such claims do not arise for injuries caused by the failure of governmental officials to perform their duties with due care.

5 Regulation and Criminal Law as a Substitute for Tort Law

The interaction of tort law liability and regulation is not only interesting from the point of view of moral hazard. Sanctions for breaches of regulation in form of criminal punishment may also be regarded as a way by which the state seeks to substitute for the missing deterrence of tort law in a no-fault system. This is relevant for employment relationships in New Zealand where the failure to comply with safety rules can result in criminal convictions. In contrast to tort, an accident does not need to have occurred. Pursuant to sec. 49 and 50 Health and Safety in Employment Act 1992, the violation of health and safety rules as such can constitute a criminal offence. In that way, regulation potentially captures a wider range of harmful behaviour while tort law is only interested in the adverse outcome of actions.

Improving safety at work, during recreational activities, and on the road has become a major concern for New Zealand. Realising that accident rates in New Zealand are comparably high, stricter rules on compliance with safety rules are being established. Specifically, regulation of occupational health and safety has gained importance in the last years. The Pike River Coal Mine disaster of 2010 resulted in a comprehensive reform of health and safety regulation. The government initiated the Independent Taskforce on Workplace Health and Safety that recommended a package of changes to the health and safety system. A Reform Bill was introduced that comprehensively amends the existing legislation. In addition, the government agency WorkSafe was launched in December 2013. It assumes former tasks of the Department of Labour and is primarily responsible for the prevention of workplace injuries, and enforces workplace health and safety regulation.

The reform bill for the new Health and Safety at Work Act has been introduced to Parliament and is planned to come into force in April 2015.[182] It will replace the Health and Safety in Employment Act 1992. The new act is modelled after the Australian Model Work Health and Safety Act that is the basis for harmonized health and safety laws across the Australian jurisdictions. It establishes

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[182] See http://www.mbie.govt.nz/what-we-do/workplace-health-and-safety-reform.

due diligence obligations of directors (officers of "persons conducting a business or undertaking"). The duties of officers and workers are enhanced, and non-compliance results in stronger penalties. The level of fines will increase substantially. In addition, the maximum term of imprisonment for individuals recklessly causing death or serious injuries is extended from two to five years.[183] The announced target of the reform is to reduce serious injuries and fatalities in the workplace by at least 25 per cent by 2020.[184]

5.1 Deterrence Elements of Criminal Law

These legislative developments indicate that regulation and criminal law are seen as a means to establish incentives for safe behaviour. Since the deterrence effect of tort law is missing in New Zealand, it seems that the threat of criminal punishment ought to fill this void. Past prosecutions show a tendency towards this approach. Already today, breaches of occupational health and safety rules can result in criminal convictions in the form of imprisonment and fines.[185] Courts also may order reparation payments to victims for the emotional harm an injury causes, property damages, and consequential loss.[186] Reparations form part of criminal convictions in combination with fines or other charges.[187]

The Health and Safety in Employment Act 1992 distinguishes two types of charges. Section 49 contains the most serious offence, and applies if a person takes an action contrary to the act or fails to take an action required by the act, knowing that the behaviour is reasonably likely to cause serious harm. This offence attracts the highest fines and the potential for imprisonment. The less serious offence of Section 50 relates to breaches of most of the duties prescribed by the act. The prosecution does not need to prove *mens rea* on the side of the offender.[188] The objective breach of one of the duties is sufficient. In that sense, Section 50 establishes strict criminal liability for the failure to comply with health and safety rules.[189] Usually this

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[183] Sec. 42 Health and Safety Reform Bill.
[184] See Cabinet Paper "Improving Health and Safety at Work: An Effective Regulatory Framework", http://www.mbie.govt.nz/pdf-library/what-we-do/workplace-health-and-safety-reform/effective-regulatory-framework.pdf.
[185] Sec. 49 and 50 Health and Safety in Employment Act 1992.
[186] Pursuant to sec. 32(5), reparations are not ordered in respect of loss for which an entitlement under the Accident Compensation Act 2001 exists. In case of a workplace accident, this includes the cost for medical care and lost earnings.
[187] Sec. 32 and 40 NZ Sentencing Act 2002.
[188] Sec. 53 Health and Safety in Employment Act 1992.
[189] *Mair v Regina Ltd* DC Dunedin CRN3045004405, 4 March 1994, [1995] NZLR 111, at 2-3.

involves the failure to comply with suspension, improvement, or prohibition notices in the context of an inspection. Breaches of the safety duties set out in Part II of the act or in regulations as such may attract a fine as well.

The defence may prove that on the balance of probability there was a total absence of fault on the side of the defendant and all due diligence was exercised. The employer may be exculpated if the fault was entirely that of the employee. An example case is *Powermark*, in which an experienced worker was injured felling a tree although his supervisor had explicitly instructed him not to fell this tree.[190] The due diligence requirement is, however, wide and the employer has to anticipate risky behaviour of employees. The obligation to take "all practical steps" to minimize harm includes recognizing that employees will sometimes be careless of their own safety.[191] The ample scope of the employer's duty of care has been described by Judge Everitt in *Regina*:

"It requires employers to be proactive; in other words to seek out all hazards and to take steps to prevent injury to workers. Employers are now required to be analytical and critical in providing and maintaining a safe working environment. It is not just a matter of meeting minimum standards and codes laid down by statute. It requires employers to go further and to set their own standards commensurate with the principal object of the Act, after due analysis and criticism."[192]

For example, in *United Fisheries* a worker died climbing into an ice tower where a screw conveyor was operating. Although this behaviour was clearly foolhardy, the employer was aware of the need to enter the ice tower and could foresee that employees might override the safety system. The failure to install a simple grill to make the ice tower safe substantiated that the employer had not taken all practicable steps.[193]

The requirement of the Health and Safety Act 1992 to take all practicable steps has been criticised for being too lax. Barrett and Thomson (2012) note that the practicability test involves a balancing of cost and benefits, which "facilitates the subordination of human dignity to profit." They observe that courts take the

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[190] *Department of Labour v Powermark New Zealand Ltd* [1996] DCR 224.
[191] *Department of Labour v de Spa & Co Ltd* [1994] 1 ERNZ 339 (HC), at 349.
[192] *Mair v Regina Ltd* DC Dunedin CRN3045004405, 4 March 1994, [1995] NZLR 111, at 18-19.
[193] *United Fisheries Ltd v Department of Labour* HC Christchurch A67/97, 1 August 1997 [1997] ELB 130.

individual financial position of employers into account when assessing whether a safety measure was reasonably practicable. As a consequence, the expected safety would depend on the capitalization of the employer, not on objective standards. In the authors' opinion, this market calculus attitude towards safety was reflected in the Pike River mine disaster. A tube bundling system that could have detected explosive gases was not installed because of budgetary issues.

Given that New Zealand's accident compensation scheme substantially diminishes incentives to take care, the internalization of some accident costs due to criminal liability improves the situation, regardless of the level and scope of liability. Health and safety law certainly has a deterrence effect as individuals in charge of businesses can be personally liable. Strict liability ensures that employers cannot easily exculpate themselves by pointing to the failure of employees to take care.[194] Rather, they have to anticipate and mitigate reckless behaviour on the side of employees.[195] The rational employer decides on safety measures taking the expected cost for punishment in form of fines, reparations, and imprisonment into account. The increased costs of accidents act as an incentive to invest in safety and as a deterrence from violating health and safety rules. In respect to reparations, the deterrence effect may be weakened since statutory liability insurance is available that indemnifies firms or their officers for this responsibility.[196] Such liability insurance is unlawful though with regard to fines for breaches of occupational health and safety regulation.[197]

The figures in Table 1 show the tendency of courts to impose increasingly higher fines and reparations per case. While the combined charges for fines and reparations amounted to roughly $14,500 per conviction in 2006, the penalty per conviction has been about $37,000 in 2012.[198] Consistently, higher amounts of fines than reparations have been imposed. The deterrence element of criminal convictions

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[194] The situation is comparable to the English tort liability of employers, which approaches strict liability; see Ch. 2.

[195] Employees also have a general duty to take care, sec. 19 Health and Safety in Employment Act 1992.

[196] See https://en.wikipedia.org/wiki/Statutory_liability specifically for examples of such insurance in New Zealand. Private insurance firms will, however, find ways to mitigate moral hazard such as excluding frequent offenders from insurance.

[197] Sec. 56I Health and Safety in Employment Act 1992.

[198] The inflation-adjusted figures based on the CPI of the first quarter of 2014 are $17,198 and $37,728, respectively, according to the inflation calculator of the Reserve Bank NZ, available at http://www.rbnz.govt.nz/monetary_policy/inflation_calculator/.

has clearly priority over the compensation of victims.[199] Criminal law is not directed to compensate, and is not designed to fill the gap of accident compensation law in relation to the amount tort law would have awarded to the victim. Rather, both reparations and fines act as deterrence elements. What matters for the courts is the sum of both forms of punishment. Effectively, increased reparations have substituted for fines (Gordon and Woodfield, 2006b). The increase of the combined punishments appears to be motivated by the concern that deterrence is weak.

Given these observations, one might wonder whether criminal law in New Zealand substitutes for the missing deterrence from tort law that has been described above. The next section examines whether this is indeed the case.

Table 1:   Statistics on Health and Safety Prosecutions in New Zealand

Year	Fatalities	Serious Injuries	Convictions	Fines	Reparations
2006	75	375	99	$558,150	$881,030
2007	54	402	88	$1,150,900	$831,450
2008	63	387	69	$1,556,700	$1,315,517
2009	72	360	84	$2,254,800	$1,783,840
2010	87	366	104	$3,005,973	$1,758,150
2011	114	384	51	$1,395,765	$707,176
2012	48	387	49	$1,350,737	$458,990
Total	**513**	**2.661**	**544**	**$11,273,025**	**$7,736,153**

Note: Total convictions, fines and reparations under the Health and Safety in Employment Act 1992 and accompanying regulations. Fatal and serious non-fatal work-related injuries.
Sources: Department of Labour Health and Safety Prosecutions, http://www.dol.govt.nz/hs/resources/stats/prosecutions.shtml; Statistics New Zealand, http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7935#.

5.2   Limited Deterrence of Criminal Sanctions

Although the tendency of the law is to increase punishments for offences of health and safety regulation, criminal sanctions cannot fully replace the deterrence effects of tort law. This is due to the way criminal law is applied in practice. All in all, the number of convictions and the level of penalties are quite low (Gordon and Woodfield, 2006b). Given the number of fatalities and non-fatal serious injuries, it

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[199] In regard to individual sentencing, though, the reparation has primacy over fines if the defendant is not able to pay both (Hall, 2007, p. 237).

can be assumed from Table 1 that only the most severe workplace accidents result in prosecutions. Obviously, there is no clear relationship between the number of injuries and the number of convictions since one conviction can relate to several injuries, or more than one person could be responsible for an accident.[200] The figures indicate, however, that not all serious injuries are being prosecuted and certainly not less severe incidences of health and safety offences.[201] Admittedly, total enforcement is not necessary for the deterrence effect of criminal punishments. But the conviction rates found in New Zealand do not seem to adequately replace the deterrence effect of tort. Serious workplace accidents result in criminal prosecutions also in other countries that have tort law in place.[202] In these jurisdictions, deterrence results from both tort law and criminal law for serious offences while in New Zealand only the latter exists.

The low level of fines has been a reason for the increase in maximum penalties under the current reform.[203] The average penalty for a serious injury or fatality (about $6,000 in the entire period in Table 1) is by no means comparable to what could be expected from a tort law regime. The low level of fines has been acknowledged by the Ministry of Business, Innovation and Employment (MBIE). It notes that 55% of all fines are less than $30,001, and 92% are less than $50,001 (MBIE, 2012, p. 40). The low level of fines cannot be explained by the fact that victims of workplace accidents already receive compensation by the no-fault insurance ACC.[204] Criminal reparation is directed towards emotional harm that is excluded from ACC compensation. Tort law in principle awards damages for pain and suffering that in a single case may amount to what is imposed annually as reparation in New Zealand.[205]

Detailed information on charges in health and safety prosecution cases is estimated by Woodfield et al. (2013). The authors observe changes in the determination of fines for violations of the Health and Safety in Employment Act

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[200] In addition, an accident is not necessary for a conviction, see above.
[201] Pursuant to sec. 56A-F Health and Safety in Employment Act 1992, violations may result in infringement notices and fees, though; these are not part of the criminal convictions.
[202] See sec. 33 UK Health and Safety at Work etc Act 1974.
[203] See Cabinet Paper "Improving Health and Safety at Work: An Effective Regulatory Framework", para. 45.
[204] Another explanation could be that judges feel that the stigma associated with criminal convictions is itself a substantial punishment.
[205] According to Karapanou and Visscher (2010, p. 64), the highest amount awarded for pain and suffering damages as of 2005/06 (all kind of tort cases) was EUR 333,000 in England.

1992. They consider how the starting point for fines evolved in the case law, and analyse the sentencing approach of criminal courts in three periods: (1) prior to the Sentencing Act 2002, the High Court judgment in *De Spa* provided sentencing guidelines for subsequent decisions;[206] (2) the approach to sentencing had changed little with the commencement of the Sentencing Act 2002 (Hughes, 2009); (3) only the 2008 High Court judgement in *Hanham & Philip* altered the attitude and subsequently resulted in higher fines.[207] In *Hanham & Philip* the High Court set three starting points according to the degree of culpability. Fines for low culpability should not exceed $50,000, fines for medium culpability should be in the range between $50,000 and $100,000, and for high culpability between $100,000 and $175,000, although higher starting points might be required in cases of "extremely high" culpability. In addition, the High Court rejected the previous practice to reduce fines dollar-for-dollar by the amount of reparation.

According to the empirical analysis by Woodfield et al. (2013) fines increased strongly after the judgement in *Hanham & Philip*. The mean fine for cases of a breach of Section 6 of the Health and Safety in Employment Act 1992 increased from $13,957 to $33,627. The authors also establish that the variation in fines decreased as a result of introducing mandatory starting points. While the standard deviation of fines before the judgment was 141% of the mean of case-level fines, it dropped to 62% afterwards. The variation shows that guidelines for fines and reparations are important for consistency and predictability. Tort law practice in other jurisdictions often develops such standards that are collected in tables listing common penalties applied in certain circumstances. For example, in the United Kingdom the Judicial Studies Board publishes 'Guidelines for the Assessment of General Damages in Personal Injury Cases'. Such guidelines are missing for New Zealand's criminal prosecutions under the Health and Safety in Employment Act 1992. In contrast to tort actions, criminal prosecutions need to focus on the most severe cases as the state has limited resources for the enforcement of regulation and prosecutions. Hence, not enough cases exist to produce detailed guidelines. According to the MBIE, New Zealand's District Court judges do not encounter health and safety cases regularly enough to develop expertise in this field. On average, a

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[206] Department of Labour v De Spa and Co Ltd [1994] 1 ERNZ 339.
[207] Department of Labour v Hanham & Philp Contractors Ltd & Ors [2008] 6 NZELR 79.

judge hears only fifteen cases within twenty years (MBIE, 2012, p. 40). As a result, the reparations and fines in health and safety cases are less predictable and more random than damages under tort law.[208] The lack of consistency in fines has been describes as "something of a lottery" (Thomson et al., 1998, p. 136).

In contrast to private law, criminal cases centre on the injurer, not the victim. Woodfield et al. (2013) note that judges tend to be more lenient towards defendants with limited financial capacity. Fines of small employers are substantially reduced, to avoid social hardship. Also the availability of statutory liability insurance matters:[209] Clark (2008) finds that employers without such an insurance pay lower fines when the reparation award already reduces their financial capacity to pay a fine.

The low level of fines and the low likelihood of a prosecution reduce the expected cost of criminal sanctions for non-compliant employers. Gordon and Woodfield (2006a) estimate for the current health and safety legislation of New Zealand that the probability of an accident due to deficient care is significantly greater than the probability that the deficient care is detected ex ante. As a result, the expected penalties are significantly lower than the expected harm. In spite of the recent increases in maximum and actual fines, the authors find it "unlikely to expect a comprehensive socially optimal level of deterrence of unsafe practices" (p. 11). Although regulation and criminal law can punish unsafe practices even when no accident occurs, the deterrence is, under the current regime, not comparable to tort law, which only applies when an injury has happened. To achieve deterrence effects similar to tort law, fines for unsafe practices needed to be much higher than currently.

Victims have limited ability to bring those cases to court. The state has the discretion of prosecution, and the current reform of the health and safety legislation does not intend to change this.[210] Incomplete information about accidents and limited resources of governmental agencies reduce the likelihood that infringements of health and safety laws will be punished. In contrast, victims are informed about the circumstances of a case and the consequences of an accident. They have a strong incentive to bring tort law actions.

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[208] As to the inconsistency of criminal sanctions in general, see Young and King (2010, p.256).
[209] Which is obtainable for reparations, but not for fines; see above.
[210] Sec. 164-165 Health and Safety Reform Bill.

Due to the lower likelihood and the consideration of defendants' individual situations, deterrence from criminal sanctions is limited compared to tort law. Admittedly, judgement-proof individuals are neither deterred by financial punishments nor by the prospect of tort damages; in these cases, criminal law with the threat of imprisonment or community work still provides deterrence.[211]

6   Effectiveness of Health and Safety Regulation

As the previous section shows, criminal punishment is not very effective in the context of occupational health and safety. This has also been demonstrated by Maré and Papps (2000) who investigate the effectiveness of occupational health and safety regulation in New Zealand. They find only modest deterrence effects of regulation on health and safety risks at the workplace.[212] Reviewing other international evidence, they find marginal effects of the enforcement of health and safety regulation on injury rates. The poor impact of regulation on safety is confirmed by a more recent study of falls in New Zealand's construction sector in the years 2007 to 2009. The Department of Labour (2012) finds that the majority of serious injuries are caused by falls from temporary structures, such as scaffolding or ladders that are less than three meters high. The falls thus occur under the mandatory height above which employers have to provide fall protection under Regulation 21 of the Health and Safety in Employment Regulations 1995 (p. 12). Health and safety regulation and inspectors are primarily concerned with falls from greater height (p. 11). Although employers have responsibilities for safety precautions according to Section 6 of the Health and Safety in Employment Act 1992, in most cases the injured workers were not formally trained in health and safety practices or did not possess the required skills for the job (p. 12). In almost one third of the accidents the victims disregarded or ignored instructions (p. 11).

The perception in the industry on the effectiveness of regulation is mixed. Firms frequently complain about the high cost of compliance and health and safety inspections. According to Mickell et al. (2001), business in New Zealand has expressed on-going concern about excessive or unnecessary cost, in particular for small and medium-sized companies. They investigated the perceptions of a sample of

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[211] Cf. Hall (2007, p. 262). Judgement-proof employers are, however, likely to eventually go out of business anyway.

[212] The statistical significance of their estimation is not robust under varying specifications.

21 manufacturing firms. Some inactive firms did not seem to invest much in compliance with health and safety, and consequently regarded costs from regulation as low. Proactive firms see the economic benefits of compliance and regard good health and safety practices as an investment. Reactive firms have often had inspections or prosecutions, and feel that they have been treated unfairly (p. 40). They believe that the cost of compliance outweighs any benefits (p. 38). The firms bear the cost for compliance out of fear from prosecution although they do not believe that safety is always increased (p. 31). Across all type of firms, there was some concern that inspections were arbitrary or inconsistent. Non-complying "sweat-shops" were not targeted, and the inspection outcomes depended highly on the individual officer (p. 32). Remarkably, most firms could not quantify the cost of complying with health and safety legislation (p. 20). The findings of this study suggest that the perceptions of firms about regulation influence their decisions on safety. Regulation seems at best to be a driver to invest in order to avoid criminal liability, not to enhance safety. Firms with a good safety attitude do not regard compliance efforts as additional cost. Firms with a low safety standard only do what they are told to do, even if it is ineffective, instead of actively seeking to enhance safety.

7   Implementation of Incentive Mechanisms as a Way Forward

The New Zealand government recently reformed the accident compensation legislation, introducing incentive mechanisms. Experience rating for employers was re-introduced in 2011. The Independent Taskforce on Workplace Health and Safety (2013) has identified the need to extend the effectiveness of the risk-based levy system. According to its report, the maximum loadings on ACC levies for poorly performing employers were about 35 percent for larger and 10 percent for small firms and should increase significantly (p. 84).[213] The new agency WorkSafe works together with ACC on recommendations to reform the experience rating. In the area of motor vehicle insurance several new risk classes for light passenger vehicles based on crash safety ratings apply from 2015 onwards.[214]

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[213] Currently, the maximum modifications for firms with an annual work levy of $10,000 or more will be up to +75% and -50%, see http://www.acc.co.nz/for-business/experience-rating/index.htm.

[214] ACC, Levy Consultation, available at http://www.acc.co.nz/about-acc/consultation/levy-consultation/index.htm (last accessed 11 September 2014).

Although experience rating is part of the reform of accident compensation, it is clearly not the focus of New Zealand government policy, which is more concerned about enhancing regulation and sanctions for non-compliance. The extent of the experience rating of levies for workers' compensation that has been introduced in 2011 is limited.[215] Similarly, new experience-rated levies for car registrations apply from 2015 onwards, but only relate to basic vehicle classes and not to the individual motorist's accident history.[216] An obvious consequence of more individualized and risk based premiums is that some pay higher levies than others. Employers with a bad accident record would have higher wage costs and may have difficulties to compete. Some motorists may struggle to afford an increase in levies, and choose not to drive. A political attitude that is based on equality and affordability does not conform to such outcomes.[217]

Given the high accident numbers, individualized risk premiums seem to be unavoidable. Experience rating is effective and the most efficient means to provide incentives to take care. Much more can be done in New Zealand. Motorists could pay levies based on their individual accident history and driving experience. Employers should pay higher premiums depending on the cost of accidents that happened in their firm, not only depending on the number of injury claims.[218] Leniency towards smaller employers is only acceptable if they can prove that they were not at fault.

Another way to introduce incentives to take care would be to allow private law actions similar to some Australian jurisdictions where access to tort law is granted when a certain threshold of injury is met.[219] Tort law damages would comprise the difference of economic damages to the payout of the compensation scheme,[220] and include compensation for pain and suffering, and hence raise the expected loss from accidents for employers. To avoid discussions of fault, employers' liability should be strict, at least for employers' breaches of health and safety regulation. An exclusion of private law damages may only be considered if gross negligence of the employee can be proven. This would leave employees'

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[215] See Chapter 2.

[216] See Chapter 3.

[217] Cf. Campbell (1996, p. 206), doubting the validity of experience rating on grounds of the randomness of accidents.

[218] Currently, the calculation of the levy loading is based on the number of compensation days paid and the number of claims, see http://www.acc.co.nz/for-business/experience-rating/index.htm.

[219] For example Victoria, see Ch. 2. Liability caps should be avoided, though.

[220] Which is for employees limited to 80% of pre-incapacity earnings.

incentives to take care intact.[221] Such private law damages would be available as an add-on to the compensation from ACC. In that way, the ideal of the Woodhouse concept to ensure (a basic) compensation regardless of fault would be maintained while a better incentive mechanism would be introduced. The incentive effects of criminal law and tort law would complement each other, as it is initially designed under common law.

8   Conclusion

In New Zealand, a tendency can be observed to replace missing incentives from tort law with criminal sanctions. Health and safety legislation provides for increasingly severe penalties. The administration in form of WorkSafe focuses on more rigorous enforcement. The ideal of no-fault expressed in the Woodhouse report seeks to avoid considerations of guilt and fault. But justice demands this discussion as it is important for incentivising socially beneficial behaviour. The economic perspective on tort and no-fault concepts is concerned with deterrence effects. The injurer needs to pay some compensation in order to induce safe behaviour and investment in safety. The payment of compensation to the victim is not important for deterrence, but for the incentive to bring a court case that lies with the person who has the best access to information about the incidence. If the tort system is hindered by legislation to provide deterrence, the legal system seeks another way to restore the deterrence effect. In the case of accident compensation in New Zealand it is the criminal conviction that partially repairs incentives. This reflects a tendency of the law to evolve in the direction of optimal solutions and efficient outcomes.

Replacing tort law damages with sanctions is, however, an incomplete approach. Regulation and criminal punishment cannot fully substitute for the missing deterrence effect from tort law in New Zealand. Four main reasons can be found. First, the sanctions for a breach of regulation are very low compared to what had to be paid in tort damages. Sanctions certainly add to the incentive to take care, but are not suited to substitute for tort damages. Second, only the most severe cases come to the attention of the criminal judiciary. Whether an injury is the foundation of a criminal trial is a matter of randomness, while under tort the majority of negligent actions will result in a payment felt by the injurer. Most private law cases are dealt

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[221] Arguably, employees have an intrinsic incentive to avoid serious injuries, see Ch. 2.

with by insurers that in turn have an incentive to look at the safety performance of the injurer and may adjust premiums accordingly (Howell et al., 2002). As a consequence, private law, where it is applicable, deals with a high number of cases and not only the most severe ones. This frequency ensures that information is constantly gathered and that insurers and judges develop expertise. Information asymmetry in the legal system is greatly reduced. Third, other countries have both regimes in place, effectively letting them complement each other. The realms of criminal and of private law overlap, but are not identical. For instance, minor cases are more efficiently dealt with by the private law system. On the other hand, judgement proof individuals may not care about private law damages, but criminal law can impose sanctions in form of community work or imprisonment (Shavell, 1986).[222] Fourth, having regulation and criminal law in place does not guarantee that the rules are efficient and are effectively enforced. Another level of moral hazard can be seen in the relationship between government and society. The focus of the government on certain risks may not result in more safety for the majority of accident prone situations. Tort law may provide an effective incentive for governmental departments and safety officers to perform their duties if the state can be held liable for damages from overlooked hazards.

Having both systems in parallel maximises the effectiveness and efficiency of the law. Tort and regulation can complement each other to enhance deterrence (Rose-Ackerman, 1991). The deterrence effect of the law with tort and regulation is likely closer to a social optimum than a legal regime that relies on regulation and criminal law alone. Nevertheless, New Zealand focuses on strengthening regulation and criminal penalties. Other incentive mechanisms, such as experience rating, are being introduced as well, but with less emphasis.

One element of the reasoning for the accident compensation scheme in the Woodhouse report was the avoidance of court actions. Tort law has been identified as being costly for the parties involved, and having rather arbitrary outcomes (Ison, 1967). The compensation scheme aims at avoiding adverse consequences of the tort system as compensation is guaranteed without the debate of fault. The practice, however, indicates that the avoidance of court costs and randomness is an unrealistic

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[222] Another solution to the judgement proof problem is to require insurance, as in the case of compulsory third-party liability motor vehicle insurance found in many countries. Note that such an obligation must be enforced with criminal sanctions, too.

ideal. Courts still have to deal with accident cases. Criminal proceedings take the place of private law cases. The fines of criminal cases are at least as unpredictable as damages awards under tort law. On the other hand, the tort system does not necessarily lead to an excessive number of court cases as insurances can efficiently deal with most claims by way of settlements.[223]

The solution to missing incentives from tort law is to mitigate moral hazard introduced by the comprehensive no-fault accident compensation scheme. Experience-rated levies are an important feature of an efficient compensation arrangement, and the latest reforms of the accident compensation scheme veer towards this instrument. Even more attention to the accident history of individuals would likely improve safety further. In addition, consideration might be given to reintroducing limited access to tort law as an add-on to the existing compensation. The Woodhouse report wanted fair compensation for everyone without delay. But it did not wish for systematic under-compensation and comparably high accident rates. As it stands now, New Zealanders face unnecessarily high injury risks without the prospect of full compensation, including a hundred percent of future earnings and damages for pain and suffering. The cost of administering, insuring, and disputing such claims in limited circumstances should be justified in light of a safer attitude of society.

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[223] For example, as mentioned in Chapter 2 above, in the United Kingdom, the majority of claims under employers' liability (about 98%) are settled out of court.

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