Evaluating the Impact of the 2002 Amendments to the Health and Safety in Employment Act (1992).*

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Abstract

The Health and Safety in Employment Act (1992) radically changed the way occupational health and safety in New Zealand is regulated by requiring firms and workers to take 'all practical steps' in ensuring workplace safety. Its principal aim was to encourage employers to spend more on health and safety by increasing the cost of not doing so. Despite this legislation, there continued to be a perception that accident levels were too high. In response to these perceptions, amendments to the HSEA were passed in 2001 that were designed to increase the expected cost of non-compliance with the aim of improving workplace safety. We document and analyse the changes resulting from the amendments and how they likely affected accident and fatality rates. We then use this analysis to draw general policy implications.

Keywords: Accidents; Occupational Safety; Occupational Health; Regulation.

JEL Classification: J280; K320; L510.

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"'This is indeed a mystery,' I [Watson] remarked. 'What do you imagine that it means?' 'I [Holmes] have no data yet. It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts. . ."'

— Scandal in Bohemia in *The Adventures of Sherlock Holmes* by Sir Arthur Conan Doyle. Ed. by R. Green. Oxford University Press: Oxford. (1993, p. 8).

1. Introduction

In October 2001, in response to perceived shortcomings in the Health and Safety in Employment Act (1992) the government of the day introduced a Bill to parliament containing several amendments to the Act. On 20 December it became legislation. Margaret Wilson, the Minister of Labour at the time, hoped that these changes would make New Zealand's workplaces healthier and safer places to work in. In contrast to the intentions behind the Bill, since the amendments became law several high profile workplace accidents have occurred. These include seven deaths in an adventure tourism activity run by the Sir Edmund Hillary Outdoors Pursuits Centre in 2008, the crushing of an employee of a fumigation company in 2008, the burning of a welder in an acetylene explosion in Nelson in 2009, a worker crushed to death and the injuring of several employees in an explosion at two separate Fonterra factories in 2009, and continuing concern about the steady stream of fatalities on farms from using all terrain vehicles. While selected examples, their occurrence could indicate a failure of the amendments to make workplaces safer and healthier.

That changes to the Act should occur was not in dispute. Nor did there seem to be a widespread belief that the government should withdraw from intervening in the area of workplace safety. Unions supported the Health and Safety in Employment Act in principle but claimed that it did little to protect the safety and health of employees in practice since the DOL did not enforce the Act strongly enough.[1] They were also concerned about the lack of employee involvement in decisions employers made about workplace health and safety, arguing that this lack of involvement adversely impacted on employee safety and health. Most employers supported the Act in principle while at the same time criticising it on three fronts.[2] The first was that the performance standard of 'all practicable steps' was far too vague and created tremendous uncertainty about

[1] An example is given in *The Listener*, (1999), 27 March, pp. 28-30.

[2] Larson (2002), Ministry of Economic Development (2001), and Pask (2001).

whether they were complying with the Act. The second was that the standard of 'all practicable steps' was impossibly demanding. Firms argued that they could never meet it in practice because even if all foreseeable steps were taken beforehand to prevent accidents that in hindsight after an accident a step was apparent that could have been taken to prevent an accident. This was part of their third complaint that such a high standard combined with inconsistent standards for inspections and enforcement of the Act led to excessive and unnecessary compliance costs, adversely affected their competitiveness and economic growth.[3] That the amendments had a high public profile was because of the presence of strong dissatisfaction with the health and safety regime that existed before the Minister of Labour announced that the Act was to be reviewed. To quote an applicable newspaper article at the time:

> "Eight years on, New Zealand's health and safety scorecard is arguably worse than before the introduction of the HSE Act. In 1992 the Department of Labour estimated our industrial injury and disease toll at $1 billion to $1.5 billion. Now that figure is put at $3 billion. There has been no discernable downward trend in industrial fatalities since the introduction of the HSE Act."
> — From R. Macfie, "Health and Safety in Employment Act Scares Bosses while Failing to Cure Ills of Workplace", *Independent*, 7 March, 2001, p. 16.

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Partly in response to criticisms of the Act and partly because of a different set of beliefs about the way labour markets should operate than embodied in the Act the then Minister of Labour indicated in July 2000 that she too was unhappy with the HSEA. The Minister claimed that the rates of occupational injuries, fatalities, and ill health were too high, although it was unclear how she had deduced that the rates were 'too high', and announced that the Act was to be reviewed with a view to proposing amendments to it. In December 2000, the Office of the Minister of Labour (OML) clarified what she meant by 'too high' as well as detailing possible changes to the Act.[4] What was meant by 'too high' was that New Zealand's injury and fatality rates were higher than those of Australia and the United States based on a comparison of occupational death rates in the three countries.[5] A proposal was put to cabinet in the

[3] See *Independent*, (2001), 7 March, p. 16, and the KMPG Compliance Cost Surveys undertaken by Business NZ.

[4] Office of the Minister of Labour (2000).

[5] Feyer, Williamson, Stout, Driscoll, Usher, and Langley (2001).

second half of 2001. The resulting Health and Safety in Employment Amendment Bill (henceforth the Bill) was introduced to parliament in October 2001, the Transport and Industrial Relation Select Committee began hearing submissions on it in March 2002, which reported back to parliament in October 2002, and on 20 December the Bill was passed. The amendments to the HSEA included in the Bill were almost unchanged from those proposed in the OML discussion paper.

A key objective of the amendments was to reduce New Zealand's occupational injury and death rates to those of other countries such as Australia. This was given as the ultimate justification for the amendments by the government of the day and why employers should incur the additional costs from their implementation. Since there still seem to be a steady-stream of accidents and the resources spent in implementing the amendments could of course be used in other ways, the obvious question to ask is have the amendments actually made New Zealand's workplaces healthier and safer? And, if not, why not? In this article we seek to answer these questions.

2. The HSEA and the 2002 Amendments

The HSEA outlines the general duty of taking 'all practicable steps' to keep workplaces safe, enforced by inspectors who inspect workplaces for compliance with the Act, issue improvement and prohibition notices for non-compliance, and investigate workplace accidents and complaints.[6] Before the amendments, only inspectors could initiate prosecutions, with the cases generally heard by the District Court.[7]Those found guilty of failing their duties under the Act may be prosecuted under Sections 49 or 50. Section 49 is stricter than Section 50 and requires the Crown to prove beyond all reasonable doubt that the offender had knowledge that their actions or inaction was reasonably likely to cause harm. Under Section 49 a person or firm may face (before the amendments) a term of imprisonment for up to one year and/or a fine of up to $100,000. Most prosecutions occur under Section 50 which is a simpler test. If the duty requires all practicable steps be taken, the Crown needs to prove that offender beyond a reasonable doubt that all practicable steps were not taken. If the duty does not require this then the Crown just needs to prove that the offender did not fulfill their duty under the Act.

[6] The HSE Act is a type of regulation known as an ex post liability regulation and has been studied theoretically by Kolstad (1990), Shavell (1984a, 1984b, and 2007), and Wittman (1977). Gordon (1998) and Gordon and Woodfield (2001) use the Kolstad framework to analyse the HSEA. Gordon, and Gordon and Woodfield, argue that the HSEA increases levels of compliance by reducing firms' uncertainty about the required level of health and safety associated with the law of negligence.

[7] Prosecutions also occur under the names Department of Labour or Occupational Safety and Health Service, but inspectors still initiate them.

Table 2.1: Summary of the 2002 Amendments to the HSEA by Category

Category	Amendment
1. Increased Costs of Non-Compliance	1. Increased scales of penalties. 2. Removal of DOL monopoly on initiating prosecutions. 3. Infringement Offense Notices.
2. Increased Coverage	1. Extension of HSEA to seafarers, aircrew, and mobile workers and what happens if this gets even longer. 2. Extension of HSEA to sellers or leasers of plant. 3. Extension of HSEA to volunteers. 4. Extension of harm to include stress. 5. Extension of harm to include fatigue.
3. Increased Employee Participation	1. Right of employees to form safety committees. 2. Right of employees to elect a health and safety representative. 3. Right of health and safety representative to issue Hazard Notices. 4. Right of employees to refuse to undertake unsafe work.

Under Section 50 the maximum penalty (again before the amendments) for offenders at $50,000 if serious harm has resulted or $25,000 otherwise. While the amendments did result in important changes to the Act (the three basic types of changes central to the Bill are summarised in Table 2.1), they did not change the fundamental structure of the Act nor the basic principles underlying the Act such as needing to take all practicable steps.

Before the amendments, firms could incur costs for failing to comply with the HSEA in several ways. Firms could be prosecuted for non-compliance if a serious accident occurred, with 77 percent of prosecutions beginning in this way. Prosecutions could also follow from inspections in which an inspector found that a firm was grossly negligent during the inspection. Inspectors could issue improvement notices, which required firms to fix any specified infringements in a set period of time, issue prohibition notices, which required all workers involved with a hazard (not necessarily an infringement) to stop work until that hazard was fixed, or simply tell firms to fix something. Generally, inspectors used these tools and only prosecuted firms that failed to comply.[8] In terms of punishment for non-compliance, only prosecution or prohibition notices led to financial costs above and beyond those associated with compliance.

[8] *Health and Safety in Employment Bill: Report of the Department of Labour to the Labour Select Committee*, July 1992, p. 122.

2.1 Increased Non-Compliance Costs

The three changes of this type increased the expected cost of non-compliance with the HSEA for both minor and serious violations of the HSEA. Employers were expected to increase their health and safety expenditure to lower the probability of prosecution, as well as the probability of conviction and the fines resulting from a conviction. For minor violations, the Bill through new Sections 56A to 56I gave inspectors the right to issue Infringement Notices, an option which the DOL had been considering since at least 1998.[9]The INs are on-the-spot fines for specific, minor offences of up to $4,000 for failing to comply with section 7(1) and up to $3,000 for failing to comply with several other sections.[10]

For serious violations of the HSEA, the government was unhappy with the levels of punishment and fines, believing them to be ineffectual. Their response through the Bill was to increase the maximum penalty under Section 49 of the HSEA from $100,000 or one year imprisonment, or both, to $500,000 or two years imprisonment, or both. The maximum penalty under the less serious Section 50 was also raised, from $50,000 to $250,000. These changes were meant to signal to the courts the government's view that the level of fines being awarded was inappropriate.

Finally, in an attempt to increase the probability of a prosecution occurring, the amendments removed the DOL's monopoly on initiating prosecutions that had existed under Section 54 of the HSEA. The removal of the DOL's monopoly on initiating prosecutions coupled with the possibility of receiving compensation was thought to provide an incentive for injured employees to take private prosecutions against employers, and, accordingly, increase the probability of firms being prosecuted for non-compliance with the HSEA.

2.2 Increased Employee Participation

The second type of amendment reflected the 1972 Robens report, which was the result of a Committee of Inquiry into workplace health and safety legislation in Great Britain and was the source of much of the original 1992 Health and Safety in Employment Act. The Robens report placed a large emphasis on the concept of 'self-regulation' using workplace safety committees and worker representatives. In this spirit, Great

[9] See the media release of the then Minister of Labour, Max Bradford. Online. Available: http://www. executive.govt.nz/96-99/minister/bradford/workplace/release.htm. 11 December, 2002.

[10] OML (2000, p. 17) provides the example, "working at a height of more than three metres without adequate protection".

Britain and the Australian states have health and safety committees and Great Britain and the Australian State of Victoria have health and safety representatives or HSRs. The use of workplace safety committees and worker representatives was originally part of the Occupational Safety and Health Bill devised in 1990 by the fourth Labour government. This approach to the principle of worker involvement was not in favour with the National government elected in 1990 which emphasised individual as opposed to collective contracts and as a result the 1990 Bill was aborted. The replacement legislation created by the National government, the 1992 Health and Safety in Employment Act, while including much of the features of the Roben report thus did not include worker participation as part of it.

A new approach to worker participation in health and safety decisions was a feature of the 1999 Labour government. As stated in the OML (2000), both HSRs and committees would be "very much a key part of the desired culture change in New Zealand workplaces". The Bill compelled each employer to have a HSR elected by employees if they are medium to large workplaces or, if they are small workplaces, if the employees so wish. HSRs are entitled to a minimum amount of paid leave for training and have the right to "ready access" to "sufficient information" about health and safety systems and issues in a workplace. HSRs can issue Hazard Notices to employers (Section 46A of the Act), notify inspectors of this fact, with the notice being used as the basis for an inspector issuing an Infringement Notice and with the notice being used against the employer in sentencing if prosecuted and found guilty. Employees were given the right to form a health and safety committee and the committee (or HSR if no committee exists) has the power to recommend changes to an employer and require the employer to state why any recommendations are not followed.

2.3 Increased Coverage of the Act

The original Act came about because of frustration with the piecemeal and reactive nature of this intervention, and the different standards across industries and products resulting in a duplication of costs. The Act condensed 152 statutes that covered industrial health and safety into one framework within one act, controlled by one Crown authority (OSH, part of the Department of Labour) instead of several government agencies. But workplaces not covered by the HSEA were railways, aircraft and ships, since at the time these were covered by the Transport Services Licensing Act 1989, the Civil Aviation Act (1990) and the Shipping and Seamen Act (1952), respectively. Also, the courts' interpretation of "place of work" meant that mobile workers were not covered by the HSEA or other legislation. Given that the original approach to health and safety

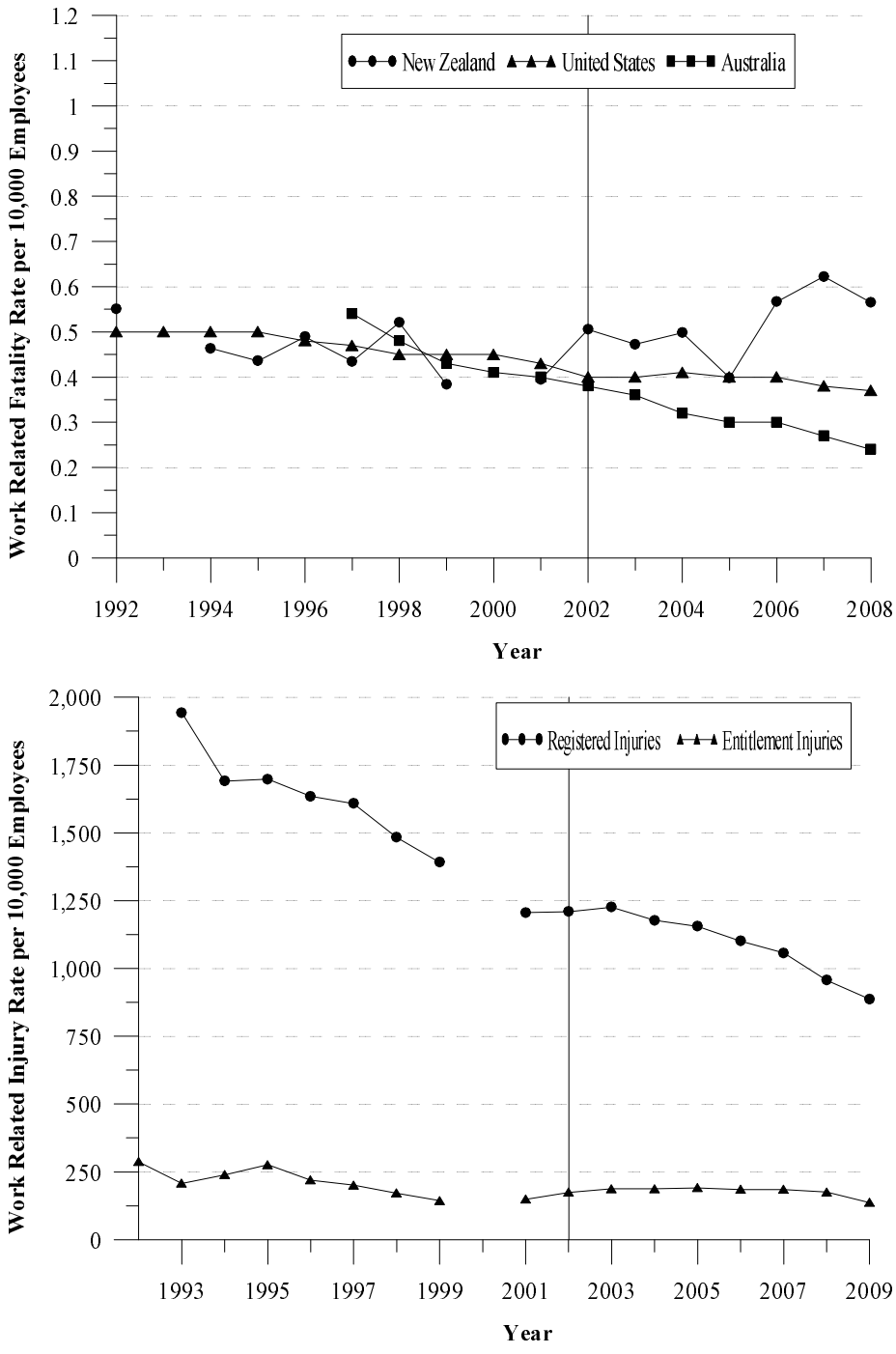
regulation was to base government regulation on a performance rather than a prescriptive standard which was in a large part designed to avoid duplication of compliance costs, the exclusion of these workplaces was an obvious omission. The amendments removed this omission for this reason and were uncontroversial. This contrasts with two of the three other amendments extending coverage of the Act which moved into new areas and did arouse controversy. Extending the Act to sellers and leasers of plant did not arouse much controversy. On the other hand extending the Act to cover volunteers and stress and fatigue was highly controversial. Extending the Act to cover stress and fatigue was argued on the basis that they affected the possibility of ill health and accidents and were under the control of employers. The argument against the extension was that employees also had control over the stress and fatigue they experienced by what they did outside work, and that stress and fatigue were unobservable and open to abuse. The extension to volunteers created concern that voluntary activities would experience increased costs, and these new costs plus the risk of prosecution would put people off volunteering.

3. Trends in Occupational Accidents and Deaths

The stated aim of the amendments was to lower the occupational fatality rate of New Zealand to those of Australia and the United States. Before addressing whether it did this, the obvious question is to ask is, was New Zealand's fatality rate higher than the rates of the other two countries? The answer is not clear cut. According to a 2004 Australian government report New Zealand in 2001 did have a higher fatality incidence rate than Australia, but it was also lower than that of the United States. New Zealand's fatality rate had also been lower than the Australian rate over 1998 and 1999. As Figure 3.1 illustrates, some official occupational fatality series show that the New Zealand rate was comparable to those of Australia and the United States and at times even below both of them.[11] The claim that a crime had been clearly committed, that New Zealand's occupational safety was clearly substandard relative to other countries we compare ourselves with, did not seem to be at all substantiated by a preliminary investigation of the available evidence.

[11] Advice we received from the DOL was to use the ACC data as it is more consistent and accurate as an indicator of workplace deaths than the DOL statistics. Problems with the DOL data being that they are not complete and the criteria for collecting workplace fatality data has changed over time. Some fatalities are not reported to the DOL and some work-related fatalities reported to the DOL are not investigated, the DOL has changed the measurement of fatalities to include bystanders (with some criticising this as a way of make the figures look bigger), and so on. See *National Business Review*, (2002), 2 August, p.1 and p.3; *The Dominion Post*, (2002), 3 August, p.5; and 10 October, p.1; *National Business Review*, (2002), 30 August, p.2.

Figure 3.1: New Zealand, United States, and Australian Work Related Fatality and Injury Rates Per 10,000 Employees (1 July 1991 to 30 June 2009)



Sources: *ACC Injury Statistics*, Statistics New Zealand Household Labour Force Survey, United States Bureau of Labor Statistics, and Safework Australia. The New Zealand rates are calculated using the ACC New Claims figures divided by the total number of employees. From 1 July 1999 to 31 March 2000 employers and the self-employed could choose a private insurer for work and non-work accidents. The 2000 figure thus underreports the actual number of work-related accidents.

The government having determined that there had been a "crime" committed, finding that employers and the courts were to blame for it, and then "punishing" them, did the "punishment", the 2002 amendments, do what the government intended them to do? If we go by occupational fatality rates, the answer is clearly no. After the 2002 amendments came into effect the fatality rate increased and furthermore a clear gap emerged between the fatality rate of New Zealand and those of Australia and the United States. What about injuries in general. Figure 3.1 suggests that occupational injury rates did fall after 2002, especially injuries registered with ACC. The problem though with simply attributing this fall to the 2002 amendments is the injury rates were falling before the amendments with the falls occurring at least as far back as 1993.

The 2002 amendments do not seem to have done what the government wanted them to do as the occupational fatality rate has not fallen and the claimed gap between New Zealand and other countries has increased and not been reduced. The injury rates did fall but were falling beforehand anyway so it seems doubtful that the amendments were the cause of this. But attributing this outcome to the amendments alone is obviously unfair as many other changes to the economy occurred after the enactment of them. It is possible that the amendments made the observed changes better than they otherwise would have been, the fatality rate would have been even higher and the injury rates would not have fallen as much if the amendments had not been passed. The rest of this paper involves examining the clues, the available data, to assess whether or not the punishment, the amendments, did indeed make things better.

4. Impact of the 2002 Amendments on Possible Market Failures

The belief that markets under-provide workplace safety has seen government intervention in occupational safety and health in New Zealand since the 1850s.[12] The rationale for this intervention being that markets left to themselves underprovide safety through some combination of workers failing to account for others when making health and safety decisions (externalities), employees incorrectly estimating the occupational risks that they face and their influence on the levels of those risks (irrational behaviour), and employers having insufficient information to monitor the precautions taken by employees or identify risk-prone employees and vice versa (informational deficiencies).[13]

[12] Campbell (1995) gives a comprehensive history of health and safety intervention in New Zealand.

[13] Evidence supporting the presence of potential inefficiencies includes Kahneman Slovic, and Tversky (1982) and Viscusi and O'Conner (1984). Evidence suggesting that inefficiencies do not exist or a small in effect include Davis and Holt (1992, p. 485) and Viscusi and O'Conner (1984).

One change in the amendments that could have affected possible market failures was the increase in the coverage of reporting and notification of accidents and serious harm from employers to those who are self-employed or principals of the self-employed. This could reduce informational deficiencies in the market for safety. It seems unlikely that it did so because reporting and notifying accidents increases the probability of being prosecuted and because the self-employed are both employee and employer and had likely already internalised the possibility and cost of accidents. Furthermore, if a self-employed person contracted to a principal is known as someone who reports accidents or serious harm to themselves, raising the expected cost to principals, in this case from being prosecuted, then they are less likely to successfully win contracts. This gives the self-employed an incentive to under-report accidents. Firth and Herbison (1990) and Dufort et al (1997) find that there is pronounced under-reporting of workplace injuries for fear of reprisal for reporting a workplace injury. This amendment to the HSEA seems unlikely to result in any significant change in how people behave and thus the number of workplace accidents that occur.

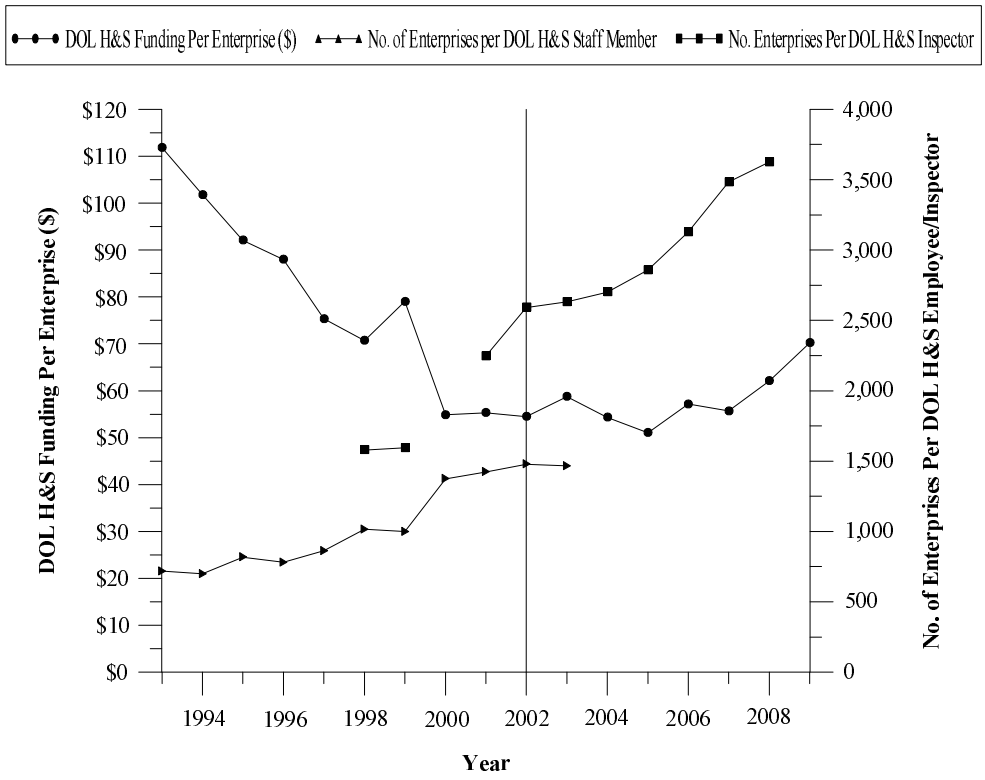
The change in the management of workplace safety to one where employees and employers interact on the basis of 'good faith', better informed employees, and employer incentives altered so that they would increase the resources they devoted to safety, were the objectives of amendments regarding employee participation. Clearly better informed employees could alleviate a market failure. It is difficult to see how HSRs and health and safety committees increase the information employees have about the dangers of workplaces. The employees are the ones directly involved in the work that is being done and would seem to be better informed about how dangerous it is. This is the basis for their rights to issue Hazard Notices and to refuse dangerous work. It is possible that employers have some types of general information about the safety of a workplace, say the overall stability of a construction worksite, or side-effects of a chemical being used, but employees through experiencing them first-hand would soon learn about most of these things and if employers were determined to hide this information then the presence of employee committees and HSRs would make little difference to the information employees have about the safety of any workplace. Supporting this argument is the work of Vanderkruk (1997) who finds that health and safety committees are only as effective as organisations want them to be. This finding is mirrored in Lewchuck et al (1996) who find that in workplaces where labour or management resisted co-management of workplace safety and health, mandating committees had little impact on accident rates.

Section 5 of the HSEA (titled Object of Act) was amended to include the statement "(f) recognising that successful management of health and safety issues is best achieved through good faith co-operation in the place of work and, in particular, through the input of the persons doing the work; and...".[14] In principle this could increase information employers have about the riskiness of specific employees, or alleviate decision making externalities or reduce the presence of irrationalities. But it is difficult to see how a law change by itself can alter the way people naturally want to interact with each other. The Australian experience of employee participation through Victoria's Occupational Health and Safety Act 1985 (henceforth the OHSA) suggests such a law change has little impact in practice. In fact, in the LaTrobe/Melbourne project (1990) (henceforth LaTrobe project), unions and HSRs were critical of the committees, arguing that employers used them to delay health and safety expenditures. It is worth noting that this obvious manifestation of conflict between employers and employees, reflecting the fact that at least in part what may benefit one costs the other, contradicts the co-operative assumption underlying the existence of such committees as well as the basis for the amendments to the HSEA. O'Grady (2000) in a detailed analysis of studies of the effects of health and safety committees argues that the approach of seeking to insulate occupational health and safety from the conflict that characterises other aspects of labour relations is "profoundly flawed".

The wider evidence is mixed regarding the effects of committees to improve workplace safety. Reilly et al (1995) find that the presence of a health and safety committee decreases injury rates, as does Weil (1999), who also finds that safety and health committees supplement union activities and that mandating safety and health committees increases the gap in injury rates between unionised and non-unionised workplaces. On the other hand, Reardon (1996) finds that the presence of a health and safety committee, even in a unionised environment, results in no significant change in injury rates or severity of injuries. O'Grady (2000) concludes that they can improve safety but only under the right conditions. He also concludes that most of the causal factors of workplace accidents are attributes of the workforce, such as ages, education and experience levels of employees, and workforce turnover rates. If the amendments do alleviate market failures it would seem to be weakly in the best-case scenario with a good chance they have no impact whatsoever.

[14] See *Brooker's Statutes of New Zealand (2003)*. Online.

Figure 5.1: Resources Devoted by the Department of Labour to Promoting Compliance with the HSEA (30 June 1993 to 30 June 2004)



Staffing numbers (full time equivalents) and Vote Labour figures (both Crown and Other revenue) are from the Department of Labour and *Appendices to the Journals of the House of Representatives*, Vol. XXXI, G-General, Wellington, New Zealand. 1993-2004. Enterprise numbers are from Statistics New Zealand. The number of Enterprises is the number of Geographic Units as calculated by Statistics New Zealand. This includes the number of Enterprises (a main criteria being that it is an organisation with more than $30,000 annual GST expenses or sales) plus the number of Enterprise sub-branches. The 1993-96 data are not comparable to the data for 1997-2002 because of a change in the definition of what constituted an Enterprise (the number of Enterprises is smaller under the old definition). Trends for the number of Enterprises closely mirrors that of the number of Geographic Units.

5. Policing of the HSEA

An important element of the amendments was to increase the expected cost of non-compliance with the HSEA for both minor and serious violations of the HSEA. It was argued that this would give employers an incentive to increase their health and safety expenditure. This aspect of the amendments included inspectors being able to issue Infringement Notices, employees being able to initiate prosecutions, and increases in the maximum penalties able to be used to punish violaters of the HSEA.

But an important factor in determining how effective these changes are in increasing the expected cost of violation is the level of funding that is devoted to them. Not just the absolute nominal level of funding, but the level of funding in real terms relative to the amount of activity that needs to be policed. Figure 5.1 indicates that DOL has had limited resources, and the level of resources has declined in recent years relative to the level of economic activity as measured by the number of enterprises that potentially need inspecting under the HSEA (the Vote Labour figures are in dollars and do not allow for the effects of inflation). In terms of the number of employees per inspector, this has increased from 9,981 to 15,443 from 1998 to 2008. The decline in the number of inspectors relative to the number of geographic enterprises (or the number of employees) is especially relevant as other things equal this change would decrease the likelihood of unsafe employers being inspected and successfully prosecuted, reducing the impact of the HSEA on the care taken by firms and others. Such an outcome is consistent with the claims of unions and the Labour Party (before it become government) that the DOL was carrying out too few prosecutions because of underfunding. The DOL's response was that in many cases there was insufficient information with which to proceed with a prosecution but maybe it was ultimately due to a lack of funding.[15]

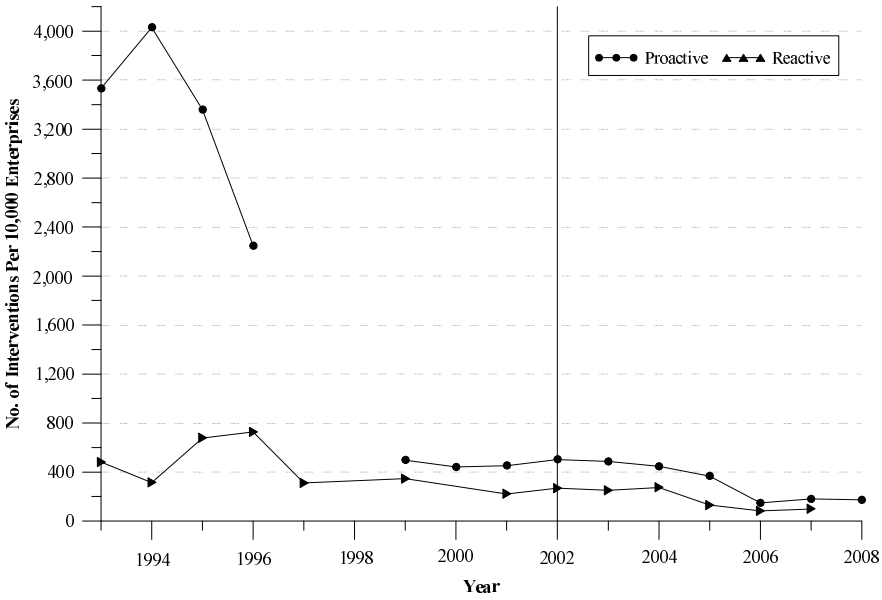
Probability of a Visit by a HSE Inspector

The main cause given in the OML (2000) for the perceived high accident rate was the low expected cost of non-compliance.[16] Given this criticism and that the stated objective of the amendments was to improve workplace safety we would anticipate that they would increase the expected cost of non-compliance through increasing the probability of being caught, increasing the fine from being caught, or both. Consider the probability of being caught. Figure 5.2 suggests that the unconditional probability of a workplace being visited by a DOL inspector before an incident occurs has steadily fallen since 1994: for an enterprise, from 0.35 in 1994 to 0.05 in 2002 to 0.02 in 2008; and for a given employee from 0.045 in 2003 to 0.011 in 2002 to 0.004 in 2008. It may be that proactive inspections are now more effective because they target only high risk industries and firms whereas previously they were more general in nature. But given the substantial falls in the unconditional probability of a visit, targeted inspections would have to have a massive impact in these firms and industries to dominate the general reduction of all firms being visited which seems unlikely. The decrease in the probability of a proactive visit would reduce the incentive for firms to take care and hence increase the number of work related injuries and fatalities.

[15] *The Independent*, (1999), 3 March, p. 9.

[16] For example see Macfie, ibid, or "Inspections Key to Workplace Safety", *New Zealand Herald Editorial*, 12 December 2000.

Figure 5.2: Number of Department of Labour Workplace Interventions (1 July 1993 to 30 June 2008)



Source: Department of Labour, Department of Labour Annual Reports, and the Comparative Performance Monitoring Reports of the Australian government's Workplace Relations Ministers' Council. Note that workplace interventions are counted as processes. This means one intervention is counted when a workplace visit process is opened and then closed. As such, repeat visits are not counted separately for proactive and reactive workplace interventions.

The number of Improvement Notices have also fallen over time from 2000 to 2005 (the figures from 2006 onwards are not comparable to earlier figures because of a change in policy to only issuing the notices to firms unwilling to comply with any required improvements). While INs do not increase the expected costs above those of compliance, Prohibition Notices do. These have also fallen which would other things equal lower the expected cost of non-compliance. Of course these changes may reflect the fact that firms have improved their safety levels. But it could also reflect the fact that the amendments are having no impact and instead it is the result of not as many workplaces are being visited due to inadequate resources. Unfortunately there is insufficient information available to distinguish between these possible explanations.

Number of Infringement Notices Issued

In principle, Infringement Notices tend to increase the probability of receiving a fine during an initial inspection, giving employers an incentive to increase their health and safety expenditures. Whether this change had an impact on reducing occupational risks is unclear. For example, Viscusi (1986) finds that health and safety outcomes in the United States are significantly more affected by the probability of being inspected than

the magnitude of the fines for violations of health and safety regulations. Interestingly, the ability of DOL inspectors to issue on-the-spot fines conflicts with the educational role of the DOL, a concern raised by employer groups in their original submissions about the Bill. Employers are less likely to seek advice and information, and to be less forthcoming when inspected, if they know the information they give could also be used to punish them. There is some evidence from Australia that the ability of inspectors to issue fines harms their educational role. This could have the perverse effect of increasing the probability of an accident occurring.

Few Infringement Notices have been issued since this option for inspectors was created (at most 32 in one year, 90 in total from 2004 to 2008) so the odds (unconditional, or conditional on a visit) of a firm being issued with a Notice are so small as to not bear worrying about. Of the Notices issued, data kept by the DOL does not record the industry of the workplace for which the notice was issued, but it does record the subject matter of the Infringement Notices and from this it appears that all but six of the 35 percent of Infringement Notices up to April 2006 had been issued to workplaces involving construction work. One each had been given to workplaces in mining, panel beating, retailing, wood working, tree felling, and tree maintenance. No data is kept by DOL about whether or not the workplaces are unionised or the numbers of employees of the workplaces. Of those notices issued, 83 percent were issued to employers or principals, and roughly half had a prior warning though an improvement notice. There was no specific category which dominated in the notices issued. While few Infringement Notices may have been issued because firms already had high safety levels in response to being punished with them, it would seem more likely that by themselves they had little impact on the level of care taken by firms and other factors were determining this choice.

Probability of Being Prosecuted

Much is made of the low probabilities of prosecution for non-compliant firms, which the media has also highlighted.[17] Given that in 2000 the Department of Labour calculated that on average a non-compliant firm will have a 1 in 8 possibility of a visit by an HSE inspector during the year, but only a 1 in 1,000 possibility of being prosecuted, and that the amendments do not change the resources going to DOL it would take a very large increase in private prosecutions to have a noticeable impact on the probability of non-complying employers being prosecuted.[18]

[17] For example see Macfie, ibid, or "Inspections Key to Workplace Safety", *New Zealand Herald Editorial*, 12 December 2000.

[18] *OML (2000) on the Review of the Health and Safety in Employment Act (1992)*, p. 17.

From 1993 to 2005 there were 3,171 prosecutions lodged of which 77.4% of the arose from workplace accidents and only 12.2% arose from an inspection. From 2002 to 2005, 83.5% of the prosecutions lodged arose from accidents and only 5.9% of these arose from an inspection. It is worth noting that the substantial fall in the number of proactive inspections during this period. Once a prosecution was lodged, 68.6% were convicted between 1993 to 2007 and 61.9% were convicted between 2002 and 2007. The average number of prosecutions lodged per year has fallen from 275 between 1993 and 2001 to 116 between 2002 and 2007.

Whether we use the number of geographic enterprises, or the number of employees (as a proxy for the number of firms), or the number of workplace injuries, the unconditional probabilities of being prosecuted or convicted are extraordinarily low. Even if prosecuted a firm would now have roughly a one in three chance of avoiding conviction. The unconditional and conditional probabilities of a workplace or a firm being prosecuted has also significantly fallen after the amendments. The question is what caused this outcome? It could reflect less resources available for the DOL relative to the population of firms and employees they police. Fewer inspections, fewer prosecutions lodged, and a reduced ability to secure a conviction. It could also reflect firms responding to various parts of the amendments by increasing their level of care and thus reducing the chances they will be prosecuted or be convicted upon being prosecuted. A possible way of finding the answer to this question is to look at the total numbers of work-related fatalities and injuries. The number of work-related injuries increased between 2002 and 2007, as did the number of entitlement injuries. The number of registered injuries remained roughly the same. Given that most prosecutions lodged were in response to workplace accidents before the amendments, and these at least stayed the same or most likely increased after the amendments, then the likely cause of the fall in the probabilities of being prosecuted or convicted were due to reduced resources for safety and health policing. If true, we would expected firms to take less care because of a reduced expected cost of violating the regulations.

Sizes of Fines

An interesting issue is whether or not the courts actually increased the average levels of fines. Before the amendments the maximum levels of fines ranged from $25,000 to $100,000, but the average fine resulting from convictions between 1 April 1993 and 18 January 2001 was only $4,387 and the highest was $35,000.[19] Fines were substantially below maximum levels, but the OML (2000) failed to consider possible reasons for this.

[19] Data from Summary of Prosecutions, Occupational Safety and Health Service. Online. Available: http://www.osh.dol.govt.nz/law/prosecutions/index.html.

The criteria for setting fines were laid out in Department of Labour v de Spa & Co Ltd.[20] These criteria include the degree of culpability, the degree of harm resulting, the financial circumstances, attitude, plea and previous record of the offender, the need for specific or general deterrence, and any other relevant factors. The Court noted that although parliament was signalling to the courts that penalties should be increased by setting the maximum fine ten times greater than previous health and safety legislation, not too much should be made of it.[21] The Court held that sentencing was not a mathematical exercise because: "[w]hile the underlying philosophy behind the increases must be carefully borne in mind, the circumstances of the individual case are all important." The fact that general and specific deterrence are criteria courts consider when setting fines indicates that other factors may be reducing fines.

Overall there was a significant increase in the average real cost for a firm from being convicted after the amendments came into effect. Of the 1,824 convictions from 1997 to 2000, the average fine and reparation award per conviction (to workers, dependants, or members of the public) were $5,914 and $2,901 (or 49% of the fine). This had increased to $7,539 and $4,575 (or 61% of the fine) for the 795 convictions between 2002 and 2007. The average fine and reparation award per conviction increased by 27% and 58% respectively, while inflation over this period was 12%. While the average fines and awards have increased, the increase does not come anywhere close to the size of the increases in the fines maxima. Furthermore, by itself the impact of the increased fines was probably small because of the low probabilities of either an accident occurring or a prosecution following an initial inspection.

Then there is choosing between the cost of being convicted versus the cost of taking increased care. A causal glance of current prices of safety equipment shows the cost of full mask respiratory protection is roughly $400 to $650 per mask with gas filters costing about $30. Lace-up boots for foot protection are between $150 to $200 per pair of boots and safety harnesses are between $150 to $500 per harness. Then there are training costs, ongoing maintenance and replacement of the equipment, potential lost productivity if the equipment slows workers down or restricts what they can do, and so on, not to mention that the equipment has to be used correctly by the employees. The average fine may simply not be sufficient to justify taking high levels of care, even with the increases in the fines observed. Finally, raising fines and punishments by itself may likely only have a moderate impact on compliance levels of employers at best. Viscusi (1986) suggests that the probability of inspections is a much more important

[20] Ibid.

[21] Mazengarb's Employment Law (2001).

determinant of firms' health and safety expenditure than the level of fines. This suggests that even if the courts substantially increased the fines they levied on non-compliant employers, this alone would have little impact on compliance rates. Overall, it is likely that the increases in the fines maxima by themselves had little if any impact on the level of care taken by firms.

Employee Penalties

Although the focus of the HSEA is on employers, employees are also liable for their actions affecting workplace safety under Section 19. Section 19 requires employees to take 'all practicable steps' to ensure their own safety and to ensure their actions, or inaction, do not harm others. Despite the threat of prosecution, the HSEA has likely had little impact on worker incentives. To begin with, Section 19 for employees has only one section and 68 words detailing their HSEA duties compared to the ten sections and 1,485 words of Sections 6-15 detailing duties of employers. Judgements on numerous cases have made it clear that the Courts also take the view that the primary responsibility for workplace health and safety under the HSEA lies with the employer and have ruled that employers are not only liable for their own actions but are also liable for the negligence on the part of their employees (see Gordon and Woodfield (2001, pp.16-27)). According to DOL statistics, there were only 120 prosecutions leading to 65 convictions for breaches of Section 19 during the period 1 April, 1993 to 18 January, 2001 while New Zealand's employment averaged 1.7 million people over a similar period.[22] The average fine resulting from those convictions was only $957. Since the probability of a conviction was only 0.00004, a worker would have been unlucky to be punished by the DOL. The amendments do not change this feature of the HSEA and will have no direct impact on improving workplace safety resulting from employee's choices.

Number of Hazard Notices Issued

The ability of HSRs to issue hazard notices, notify inspectors, and advise employees that their work is likely to cause serious harm who can then cease the work, does change incentives faced by employers (these provisions are similar in nature to those used in Victoria). These parts of the Bill enable employees to impose costs on the firm in the form of increases in the probabilities of being inspected and thus of being found non-compliant, of being prosecuted, and the size of any fine resulting from a successful prosecution. The ability to issue hazard notices and notify inspectors may lead to costs above those associated with compliance with the immediate hazard at hand. Inspectors may find additional infringements during their investigations or be more likely to inspect

[22] Household Labour Force Survey, Statistics New Zealand. Prosecution data from *Summary of Prosecutions*, ibid.

the firms in the future. Work cessations will be even more costly for employers because they interrupt production with the associated opportunity costs that result from this.

Hazard notices, inspector notifications, and work refusals only have an effect if the employees are willing to use them. While any increase in employer health and safety expenditure bought about by the enforcement rights will increase the HSR's utility as well as those of their fellow workers, an HSR may be unwilling to take any actions if there is a personal cost from taking these actions. Wilkinson (2001) shows that in theory HSRs will only issue Hazard Notices if they are confident that inspectors will prosecute non-compliant employers and the personal cost to the HSR from doing so is relatively low. If the personal cost is high, because of future punishment by the employer or fellow employees or being ostracised from the employee's community, then HSRs will be reluctant to issue Hazard Notices and the probability of being caught non-complying would not change significantly.

The Victorian experience is that HSRs have used their enforcement rights sparingly. Evidence from the LaTrobe project shows that Personal Infringement Notices (or PINs, the equivalent to Hazard Notices) are issued in Victoria, although only by union associated HSRs and not as many as unions think are warranted. Unions argue that many more PINs would be issued were it not for the costs that the HSR bears, describing these costs as intimidation by management and also community intimidation in some cases (especially in small, rural, towns where a person's reputation around town is more important than in other places and can be affected by management, or the perceived viability of an employer upon which the economy of the town is dependent is seen to be at risk). Creighton and Rozen (1997) point out that Victorian law protects the HSR from some punishment such as dismissal, if it can be shown that the punishment occurred in response to the HSR's health and safety actions. They go on to argue that, although there are laws allowing firms to apply for the removal of wayward HSRs, the practical use of these laws is limited, preventing the dismissal of HSRs to a large extent.

Another complaint of unions is that HSRs become reluctant to issue PINs because inspectors may not back them up. The project uses the results of interviews with inspectors to estimate that inspectors uphold fifty-five percent of PINs. The unions were also critical of inspectors for failing to prosecute firms that did not comply with a PIN even after it had been upheld by an inspector. In spite of these problems, even unions believe that firms comply with PINs issued by HSRs "ninety-nine percent of the time". Interviews in the LaTrobe project show that firms did indeed fail to

comply with inspectors' decisions to uphold a PIN. On the other hand, there were no prosecutions for non-compliance with PINs (nor inspector issued improvement and prohibition notices) between 1985 and 1988. The project found that the probability of prosecution was low because of a perception amongst inspectors that in order to prove non-compliance with a notice in court an inspector also had to prove the notice was justified. The data shows that only 46.29 percent of prosecutions for all offences resulted in conviction, while the average fine for all convictions between 1986 and 1988 was NZ$2,894.98 (June 2000 dollars).[23] That HSRs may believe inspectors would not back them up is a real possibility in New Zealand given historical complaints about the lack of funding of DOL as noted previously and that the amendments do not address the level of funding of DOL, and the standard of proof required for action by inspectors, particularly in initiating prosecutions, is likely to be higher than for HSRs in issuing hazard notices (and DOL already use this as a defence against claims that they do not carry out enough prosecutions).

Unfortunately, neither the Department of Labour, the New Zealand Council of Trade Unions (NZCTU), nor Business New Zealand keep any records about how many Hazard Notices are issued at workplaces.[24] Anecdotally, the NZCTU are aware that many Hazard Notices are being issued by Health and Safety representatives and that the issues raised in the Notices are almost always resolved without requiring any DOL intervention. If they are not, the DOL would follow them up as a complaint but according to the NZCTU the DOL has received very few such Notices, and the DOL would have simply recorded them as a complaint along with other causes of complaints. No Infringement Notices or prosecutions have followed a noncompliance with a Hazard Notice, which is similar to what was reported about Victoria

The experience of HSRs in Australia where unionised firms issue substantially more Hazard Notices than non-unionised firms could have the unintended consequence of the amendments causing overall workplace safety to fall. The HSR legislation's focus on larger, unionised firms will reduce the amount of time inspectors spend at small, non-unionised firms, reducing the expected cost they face from being non-compliant. The fall in non-compliance costs at small and non-unionised firms will cause them to lower the resources they devote to workplace safety below current levels even though such workplaces are responsible for a considerable amount of employment and are far riskier than larger firms. This would suggest an increase in the total number workplace

[23] Fines are adjusted to 2000 dollars using the CPI index from *International Financial Statistics CD-ROM*, Washington D.C.: International Monetary Fund, version 1.153.

[24] Private correspondence with Rex Moir, Senior Policy Advisor, DOL, Karen Fletcher, Health and Safety Organiser, NZCTU, and Barbara Burton, Legal Advisor, Business New Zealand.

accidents rather than a decrease. Considering New Zealand, the hypothetical possibility of a perverse effect of the amendments becomes more real when considering the structure of its labour market. In 2003 unions only represented 22 percent of all wage and salary earners in New Zealand, some of these unionised employees worked outside of the main centres or work in small firms, where the personal cost of HSRs issuing PINs was likely higher, and 65 percent of all unionised employees worked in the public, health, education, finance, or retail sectors, which had low accident rates. These figures in 2006 are almost identical to those in 2003.[25]

Refusals to Work

Unfortunately, neither the Department of Labour, the New Zealand Council of Trade Unions, nor Business New Zealand keep any records about how many refusals to work occur under the HSEA. Given that it was indicated that the DOL would keep records of unresolved refusals to work under the HSEA and that no data of this occurring exists, this should be taken as meaning that if any refusals to work under the HSEA had occurred then they must have been resolved at the workplaces. This amendment was likely to have been cosmetic anyway as withdrawal of labour on health and safety grounds had been a possibility under industrial rights and employment relations legislation long before S28A. It is true S28A gave this as an automatic right to an individual employee, but its effect on the level of care firms take would be expected to be minor given that individual rights under common law to withdraw labour had already existed.[26]

Number of Self-Initiated Prosecutions

The removal of the DOL monopoly of initiating prosecutions does increase the probability of being caught after an accident occurs because while it does not increase the probability of being caught by the DOL, it does increase the probability of being caught by others. Initiating private prosecutions seems unlikely in practice given the private cost of prosecution and the fact organisations such as unions which could help fund such prosecutions have a limited coverage of the workforce. According to the NZCTU no unions have taken any private prosecutions under the HSEA at the time of writing. Business New Zealand and the DOL do not know of any private prosecutions under the HSEA following on from the Bill. There have been six prosecutions by Maritime New Zealand but this is a statutory body and so can be treated as an extension of the DOL. This feature of the amendments has likely had no impact on the level of care taken by firms.

[25] See May et al (2003) and Feinberg-Danieli and Lafferty (2007).

[26] Private correspondence with Barbara Burton, Legal Advisor at Business New Zealand

6. Other Relevant Factors

Industry Demographics

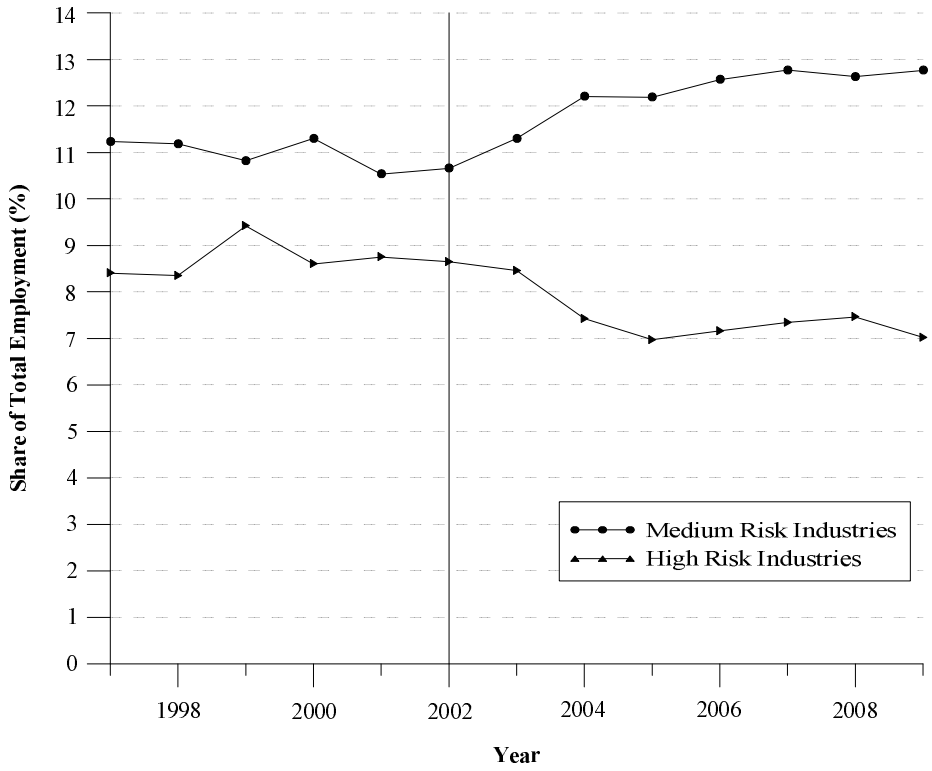
Feyer et al (2001) detail how New Zealand occupational fatality rates differ across industries, ranging from 56.86 male fatalities per 100,000 employed in mining between 1985-1994 to just 0.72 for wholesale trade (and male fatalities are 98 percent of total fatalities). That fatality rates differ across industries highlights the possibility that total fatality and accident rates might change if the share of employment shifts from one risk type of industry to another risk type. Figure 5.4 illustrates what has happened in terms of the shares of hours worked in medium and high risk industries. Medium and high risk industries in the Feyer study made up a quarter and a half of all workplace fatalities respectively. The share of hours worked in medium risk industries is roughly the same in 2007 as in 1989. From 2002, the basic trend has been that the share of employment in high risk industries has fallen, it has increased in medium risk industries, and the share of employment in low risk industries is virtually unchanged. The changes in the shares seems relatively minor, but these industries accounted for over half of all male fatalities over the period studied by Feyer et al. This would suggest that even a small fall such as was experienced from 2002 to 2009 would likely have led to a fall in the number of occupational deaths other things considered. It is possible the change in employment was caused by the amendments as firms moved to safer industries with lower expected safety and health costs, but whatever caused the change, we would still have expected the fatality rate to fall (and presumably the injury rates too).

Another industry factor that could affect the fatality and injury rates is the shares of employment by different sized firms. Smaller firms normally have higher rates of fatalities and injuries than larger firms, as they are less able to afford the higher fixed costs of improving workplace safety. This factor is unlikely to have affected fatality and injury rates since the amendments as the shares of employment by firm size have remained stable from 2000 to 2009 (using data on employee counts by region and group size from the New Zealand Business Demography Statistics published by Statistics New Zealand).

Employee Demographics

The study of Feyer et al concentrates on male fatalities because 98 percent of the fatalities over the period were male even though they only accounted for 58 percent of the workforce. This suggests another factor that potentially being male by itself may cause higher rates of fatalities and injuries than being female through biological differences between the sexes. It could also just reflect that a greater percentage of males

Figure 6.1: Share of Total Paid Hours Worked in New Zealand by Medium and High Risk Industries (1 July 1997 to 30 June 2009)



Source: Household Labour Force Survey, Statistics New Zealand. High risk industries by ANZSIC codes are agriculture, forestry, fishing, and mining. Medium risk industries are electricity, gas, water, construction, transportation, and storage. Risk types are from Feyer et al (2001).

than females select occupations that have naturally high fatality and injury rates. If it is the former, then increases in male shares of employment in medium and high risk industries would be expected to lead to increases in injury and fatality rates. Since the male share of employment in high risk and medium risk industries remained approximately the same from 1998 to 2009 (about 70% and 83%, respectively) this does not seem to be a pertinent factor. Overall the male share of employment dropped by two percentage points (from male 55.2% to 53.1% as employment of both males and females increased substantially (male employment increased 20.7% from 963,300 to 1,162,300, and female employment increased 30.9% from 783,300 to 1,025,400), but employment of females increased proportionately more than males. If the sex of a person was itself a risk factor then we could expect a drop in the fatality and injury rates.

As for the age of workers, the evidence is that younger workers have higher occupational fatality and injury rates relative to their share of employment than older workers. The share of workers by age group has changed from 1987 to 2009. The share

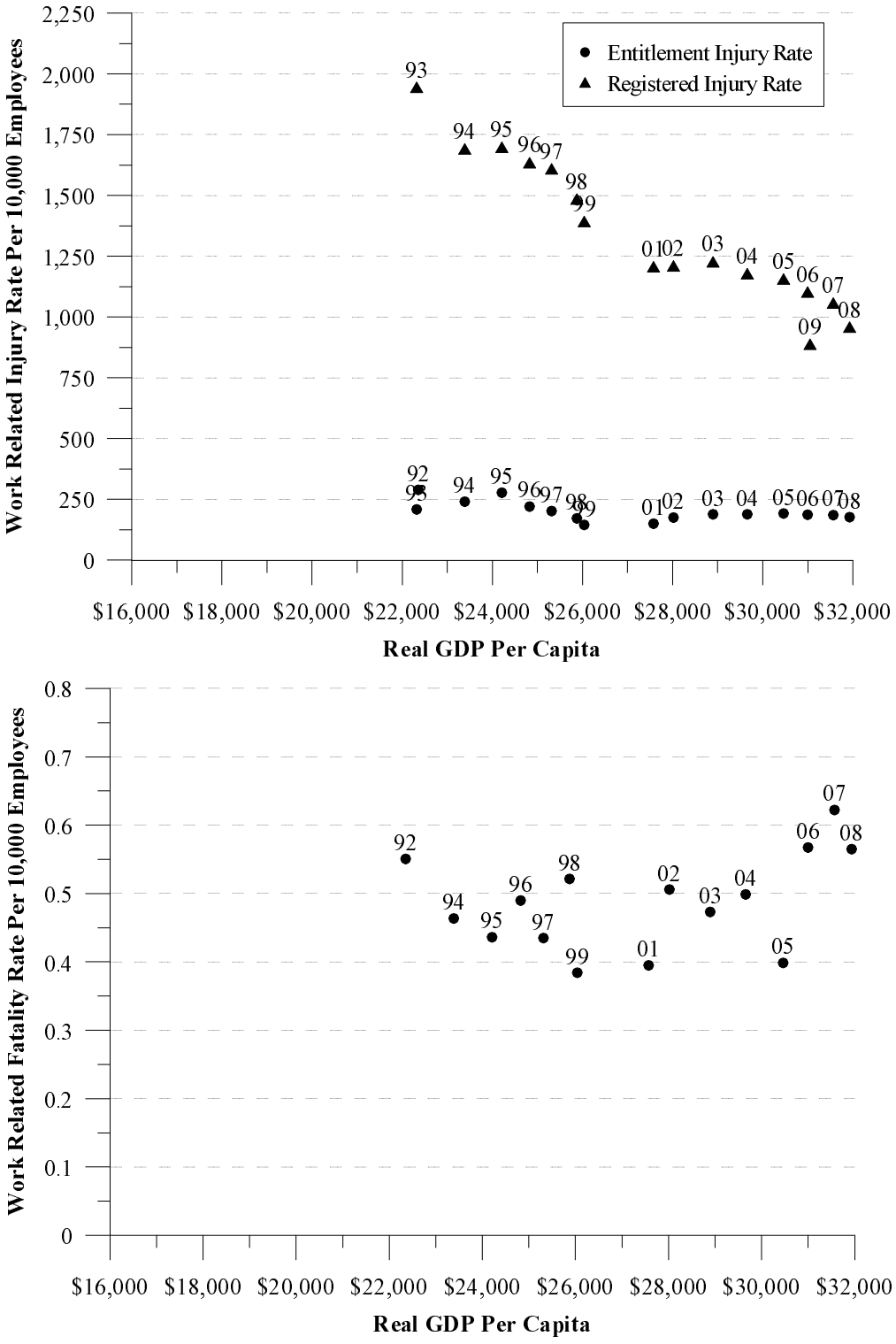
of employment of those aged 15-24 years has declined from 25% to 15% (including from 15.8% in 2001 to 16.2 % in 2002 to 15.4% in 2009). The share of employment of those aged 25-34 years has declined from 25% to 20% (including from 22.5% in 2001 to 19.5% in 2009). The share of employment of those aged 35 and over years has increased from 50% to 65% (including from 61.7% in 2001 to 65.1% in 2009). The numbers of workers in each age range has increased, just proportionately more for older workers. As for the sex of workers, it could just reflect that younger workers are attracted to higher risk occupations, but if the age of worker is by itself a risk factor then we would expect fatality and injury rates to fall.

Incomes

Keeney (1990) uses empirical evidence to show that a causal relationship between national income and national mortality is likely to exist. Building on this work, Hahn et al (2000) show that thirteen of the twenty-four United States Federal regulations considered actually increase national mortality since their impact on national mortality through income reduction outweighs the decrease in mortality from improved safety. The theoretical basis for the relationship between income and mortality being that as people become richer, the demand for safety increases if it is a normal good (if you like, the opportunity cost of being injured or killed increases). This increases the compensating differentials that people require to work in riskier occupations and gives employers a greater incentive to invest in making workplaces safer to avoid increased costs of legal damages, worker compensation, insurance costs, or the higher wage costs people require to work in a relatively unsafe environment.

As far as we know there have not been any studies on the link between income and occupational mortality in New Zealand. But looking at Figure 6.2 scatter plots of real GDP per capita against injury and fatality rates for New Zealand from 1991 to 2009 (2000 is excluded because of the privatisation of the employer account of ACC for that year meant that injury and fatality statistics grossly under-report how many injuries and fatalities occurred) suggests that there is a correlation between national income and occupational injuries (the correlation coefficient for registered accident per 10,000 employees with real GDP per capita is -0.965 and for entitlement accident per 10,000 employees with real GDP per capita it is -0.629). Clearly this is a crude tool, the relationship could be entirely spurious, and any information about causality is absent, but nevertheless it is consistent with the results of Keeney. If this relationship did exist it would explain why injury rates were falling before the amendments and continued falling after the amendments. Given the strength of this relationship, if nothing else it

Figure 6.2: Real GDP Per Capita and Workplace Injuries and Fatalities Per 10,000 Employees (1 July 1991 to 30 June 2009)



Sources: *ACC Injury Statistics*, various years and GDP (expenditure) at 1995-96 prices. Statistics New Zealand

suggests that we could have expected the injury rates to have at least fallen after 2002 independent of the amendments.

The scatter plot of real GDP per capita against the occupational fatality rate, if valid in any way, suggests that increases in real GDP would not be associated with falling fatality rates (the correlation co-efficient for registered accident per 10,000 employees with real GDP per capita is 0.34694892). This is in contrast to the results of Keeney. Given how weak this relationship is, and how crude a tool it is, the result probably indicates no impact of real GDP per capita on the rate of occupational fatalities after the amendments.

Changes in ACC Regulations

Rea (1981) shows that the presence of compulsory accident compensation can decrease worker incentives to take care. The Accident Compensation Corporation runs New Zealand's compulsory compensation system and pays weekly income compensation as well as most medical and dental bills. Courts have been complementing this by awarding part or all of employers' fines to injured employees under Section 28 of the Criminal Justice Act (1985). Although this does not happen in every case, Mazengarb's Employment Law (2001) states that it is "not uncommon". Compensation payments to employees only worsen the moral hazard problem by reducing the workers' marginal benefit of taking care. This impact could be lessened if judges accounted for the role of the worker in the accident when setting compensation, but judges have not taken this approach employees have received compensation in spite of their role in accidents.[27]These two features of worker compensation and occupational health and safety will decrease the marginal benefits of care for employees, leading employees to take even less care during their work.

The changes to the administration ACC scheme in 2001, 2005, and 2008 seem most likely to have influenced the level of care taken by employees and employers and change the basis of measuring occupational injuries and fatalities in the period immediately before and since the 2002 HSEA amendments (Appendix 1 contains brief summaries of the relevant acts). The reintroduction of lump-sum entitlements and resources devoted to rehabilitation in the Injury Prevention Rehabilitation and Compensation Act 2001 would seem to provide less of an incentive for care to be taken (people prefer a given amount of income sooner rather than later, especially if there are borrowing restrictions,

[27] For example, in *Department of Labour v Citiworks Ltd* (1995) CRN 8012020973-4 an employee received compensation for injuries received from an explosion that occurred when the employee used a welder in an oxygen-rich environment despite being warned not to by his employer.

and an uncertain income stream and risk averseness, and a reduced level of incapacity), whereas increased resources devoted to injury prevention could result in more care being taken (information deficiencies are reduced). The Injury Prevention, Rehabilitation, and Compensation Amendment Act (No. 2) 2005 increased the types of causes of injuries that were eligible for ACC coverage and entitlements (notably twisting injuries from an occupational perspective) and reduced the incentive for the self-employed to take care due to changes in the way compensation levels were calculated. The Increase in the time the injured could obtain vocational rehabilitation in the Injury Prevention, Rehabilitation, and Compensation Amendment Act 2008 would possibly reduce the level of care taken by employees or employers. Expanding the conditions covered by ACC (work-related gradual process disease and infections) would also increase the numbers reported injured. Overall, the potential effects of three Acts would seem to reduce the level of care taken in workplaces and also increase the possible number of reported injuries, working against the intention of the HSEA of reducing fatality (and presumably injury) rates, although how strong these possible effects are is completely undetermined. One point to note is that the effects of the 2008 Act would seem less relevant given how recently it was introduced.

7. Discussion and Policy Implications

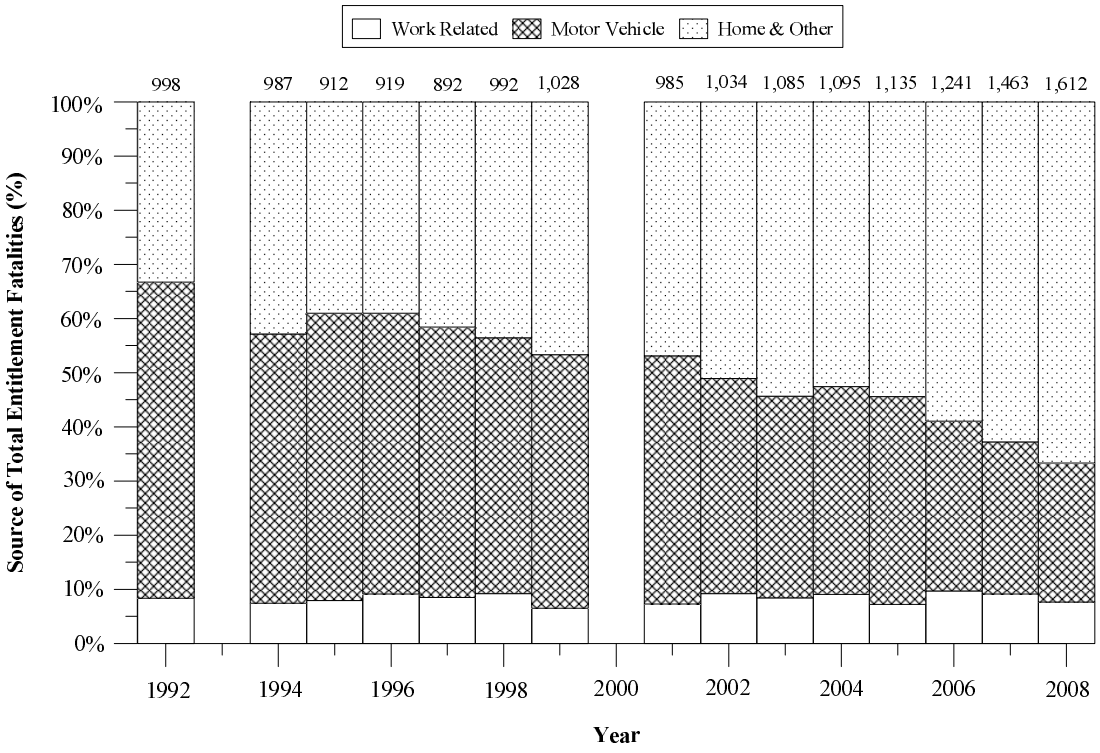
The stated aim of the amendments was to reduce New Zealand's occupational fatality rate and to reduce it to those of other countries such as Australia and the United States. Presumably this also included injury rates. The alleged crime was New Zealand's too high fatality rates. As seen, it is not at all clear that the crime ever existed. But even if it had, it is also not clear that the the increased fine maxima, on-the-spot fines, employee particpation and increased coverage (the punishments imposed) have acted to prevent it from happening again. Work-related injury rates have certainly fallen since the amendments, but they were doing so before them. Occupational fatality rates never fell and have increased slightly. Furthermore, investigating the crime scene of occupational safety for the available clues of factors that affect the level of care taken by firms suggests that the weight of evidence is against the amendments having any beneficial effects on injury and fatality rates. Since the amendments involved people and employers bearing real costs the balance of evidence suggests that society is worse off from them. So what can we learn from all of this?

1. To get a policy to work it is important to understand how the different parts of a policy change work together, and then ensure that all the parts of the policy are mutually consistent.

The objective of the HSEA amendments of improving safety depends on a combination of three things working together: that the amendments result in an increase in the expected cost of non-compliance with the HSEA; that employers increase their spending on reducing occupational risks in response to an increase in the expected costs of non-compliance; and that any increase in spending on reducing workplace risks by employers actually does lead to reductions in occupational risks. The first part of the chain is questionable for two reasons: government funding of the DOL has declined relative to the potential for workplace accidents and the decisions by Courts have not resulted in an increase in fines relative to similar cases that were brought before them prior to the amendments. Both factors reduce the expected cost of non-compliance through a decrease in the probability of detection and no change in the level of fines with non-compliance. Compounding these effects is that the presence of HSRs seems to have had little impact on the probability of detection and prosecution.

The data is lacking for the second part of the chain, but consider the third part of the chain of reasoning. This assumes that any increase in funding by employers in reducing workplace risks is not subject to serious diminishing returns and is not offset by the actions of others. Given that the easiest workplace risks are likely to have been addressed before the amendments, any increase in employer resources would be going to risks which are expensive to reduce, or alternatively that a given decrease in risk requires more resources than was the case to reduce risks when the HSEA was enacted. This means that spending is subject to serious diminishing returns. Even if the diminishing returns did not exist, the focus on increasing employer compliance with the HSEA may actually be self-defeating if employees take less care. At first glance this possibility seems silly because why would employees want to increase workplace risks they face? This possibility is not as silly as it seems at face-value when realising that just as employers face costs in reducing workplace risks, so do employees. The costs employees face are through extra effort and time, and changing their behaviour out of work (the benefits from taking care are avoiding reductions in health, wages, wealth, and changes in preferences following accidents or disease). They choose the amount of effort they put into taking care while working (moral hazard) as well as whether to work in a safe or dangerous environment (self-selection). They choose what they do away from work, such as taking drugs or not getting sufficient sleep, which affects their ability to be safe at work (moral hazard again). The existence of Section 19 requiring employees to take 'all practical steps' and the 120 prosecutions for breaches of Section 19 between 1993 and 2001 recognises that the choices made by employees can affect workplace safety.

Figure 7.1: New Fatalities by Source (1 July 1991 to 30 June 2008)



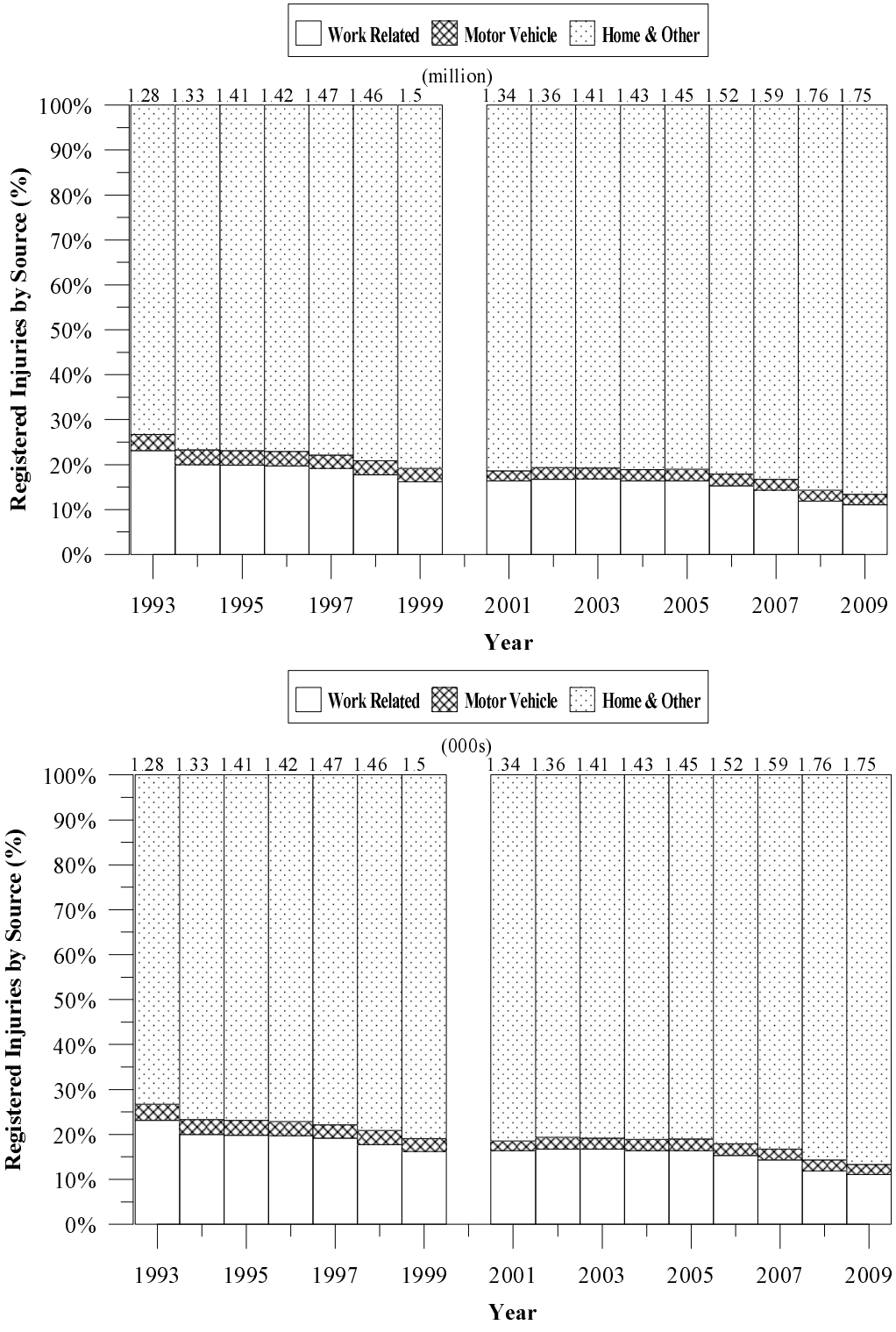
Source: *ACC Injury Statistics*, various years. From 1 July 1999 to 31 March 2000 employers and the self-employed could choose a private insurer for work and non-work accidents. The 2000 figure thus under-reports the actual number of work-related accidents.

That people choose actions that have risks associated with them consider Figures 7.1 - 7.3 as "proof". People engage in risky behaviour, using motor vehicles being a prime example (as can be seen in Figure 7.1, using cars is associated with a significant number of fatalities) because the expected benefits outweigh the expected costs.

There is no reason to think that this principle does not cover actions taken by employees that affect their workplace risk, whether these are actions outside work (such as drug use or reducing the amount of sleep for an activity) or at work (such as drug or alcohol use or avoiding using highly uncomfortable safety equipment). Efforts to improve automobile safety overwhelmingly show that drivers offset increases in safety from policy initiatives or better technology by driving in ways that are riskier.[28] A New Zealand example of this effect is studied by Garbacz (1991). Both theoretical and empirical results find that employees will act so as to increase their workplace risks if employers spend more on reducing workplace risks or if they enjoy workplace accident insurance.[29] Bateman's (1997) findings that the less care may be at home rather than

[28] See Peltzman (1975), Chrinko and Harper (1993), and Risa (1994).
[29] Lanoie (1991), Viscusi (1992), and Rea (1981).

Figure 7.2: New Registered and Entitlement Injuries by Source (1 July 1992 to 30 June 2009)



Sources: *ACC Injury Statistics*, various years. From 1 July 1999 to 31 March 2000 employers and the self-employed could choose a private insurer for work and non-work accidents. The 2000 figure thus under-reports the actual number of work-related accidents.

at work with some larger New Zealand and Australian organisations finding that five to ten time more work days are lost because of accidents at home rather than at work. Gleason et al (1991) note that seven percent of United States workers aged 19 to 27 used drugs on the job and Gerber and Yacoubian (2001) note that it was estimated that in 1997 14.4 percent of full-time construction workers in the United States aged between 18 and 49 took drugs on the job (12.4 percent engaged in heavy alcohol use). A study of New Zealand forestry workers found that 59 percent of them were heavy cannabis users and that these workers had twice as many workplace accidents as those who did not use the drug.[30] A 2001 report on drug use in New Zealand by the Ministry of Health states that (p. 19) "23 percent of men and 12 percent of women experience effects of alcohol whilst performing work, study, or household duties." It also noted that four percent of marijuana users used it at work, not to mention that use of marijuana regardless of where it was used caused memory loss, loss of energy, and feelings of paranoia. Ruby (1997) discusses the negative impact of employee decisions regarding the amount of sleep they choose on how safe they are at work.

Now apply this behaviour to New Zealand's legislative environment, it suggests that an increase in employers' expenditures on health and safety could lead to a decrease in worker effort and could even perversely lead to a higher probability of workplace accidents. The possibility of offsetting employee actions is consistent with the observed increase in the per worker cost of accidents and diseases as well as the low levels of fines imposed on employers by the Courts. If levels of harm are low or levels of firm compliance are already high, then this would be reflected by lower fines. Another likely candidate is the degree of culpability. This criteria means that fines will be lower if accidents were caused in part by employees. Low average fines could thus show that employees are contributing substantially to the perceived high levels of accidents, casting doubt over the appropriateness of the current legislation's focus on employers. Further evidence of employees' role in health and safety comes from the financial cost of accidents and disease considered earlier. If the occurrence or severity of accidents and disease has actually increased since the introduction of the HSEA, then it is unlikely that a low expected cost of compliance is to blame. Changes in employees' behaviour, however, would be consistent with this observation as well as being consistent with the parallel phenomenon of low levels of fines imposed on firms by the courts.

The wider policy implication from this aspect of the amendments is that to get a policy to work you need to understand how the different parts of a policy change work together, and then ensure that all the parts of the policy are mutually consistent. The

[30] Musson and O'Reilly (1999) and *The Evening Post*, (1991), 14 December, p. 3.

different factors affected by a policy change should change in ways that are mutually reinforcing or at least not causing offsetting changes that undermine achieving the initial objective. For the HSEA amendments to work, the policy changes could have included funding increases to allow the DOL to increase inspections with the amount of economic activity from which accidents occur, or ensuring that employees suffer fines and penalties if they have some responsibility for causing an accident or increasing the probability of an accident occurring (unpalatable as this might seem).

2. Policies should target the source of the problems before they occur not only focus on damage control after the problems have occurred

Even if the amendments did work together to decrease workplace risk, it is only a partial solution. The rationale behind government regulation is to address inadequacies of private resources used to manage workplace risks because of market failures. Without questioning the existence of market failures, governments that are truly interested in reducing workplace risks should also implement policies that attempt to correct the sources of the failures in the market for health and safety. If externalities are a problem, then to make sure employees take account of how their actions affect others they should also be liable for prosecution with the possibility of being fined. If employees and employers take actions based on incorrect perceptions of the risks they face, then government should act to produce knowledge to correct the misperceptions and make it publicly known. This is particularly so for types of accidents that occur infrequently and for health-related risks. Sponsored research about industrial health risks (such as those from methyl bromide used in fumigating logs in Nelson), industry-occupation risk based information packs and websites are examples of these types of policies. So is the legal requirement that firms pay compensation when accidents occur if they are shown to have failed to warn employees about risks they knew existed. If employees have insufficient information about how risky employers are then governments should act to ensure that either the information is made known to employees or that employees should be protected from inadequate safety by employers because they know employees do not know how risky they really are. Requiring firms to purchase workplace compensation insurance in case employees get hurt would protect employees from inadequate safety by firms created by employee ignorance or because of the inability of firms to fully compensate workers for injuries because of the possibility of bankruptcy. Requiring employers to keep a record of their safety which they have to make known to employees, with the consequence of fines if they are shown to fail to provide this information or provide incorrect information, would increase information to employees to some extent. The policy message here is that rather than just providing damage control after problems occur, government policies should also address the sources of the problems and fix them, then see what if any intervention is needed.

3. Policies need to be based on sound theories as they tell you where the sources of the problems are, what types of policies you should use for different situations, and how the policies work.

As mentioned earlier (in footnote 6 on p. 3) the HSE Act is a type of regulation known as an ex post liability regulation. As with all theories, those dealing with ex post liability regulation invoke assumptions. The need for modelling assumptions is a necessary part of building a model to study something and beyond question. What is open to questioning though is the validity of the assumptions when applying a model to a piece of reality. If the assumptions of a model are a reasonable approximation to the situation being studied then using policy conclusion from it is perfectly valid. If the assumptions of a model are far removed from the situation being studied then it is possible that using policy conclusions from the model is unwarranted. In the end what matters is the importance of any assumptions invoked and how close they approximate the reality being studied, a question needing addressing before advocating any types of policies. What is possible is that some assumptions used in the ex post liability regulation models are not close approximations of the workplace safety situation in New Zealand.

For the Kolstad type of ex post liability policy to work requires that firms know the regulatory standard they have to meet and that the standard is strictly enforced. Most firms, however, face a large degree of risk regarding potential fines from infringements because of uncertainty in the legal interpretation of the HSEA, and we already know that enforcement of the HSEA is anything but strict. Although the DOL has developed guidelines showing the standards required of firms, the courts have observed that even compliance with these guidelines is no guarantee of compliance with the requirements under Section 6 of the HSEA. The ability of firms to know whether or not they comply with the HSEA is further affected by decisions such as *Department of Labour v Northland Health Ltd* (1997).[31] In this case, the Court found that the fact that experts, including engineers and the firms' health and safety officers, had overlooked a particular hazard was not a defence against prosecution for breaching Section 6 of the HSEA.

Another assumption used in the models so far developed to study ex post liability regulations is that worker's and firm's choices about the care they each take are independent. As argued earlier, the choices are likely to be inter-dependent, which means that the assumption is false. The greater the degree of inter-dependence, the less relevant are the results of the theoretical model. A third assumption is that the worker's actions are socially optimal. This assumption effectively rules out the presence of worker compensation schemes, such as ACC or the subsidisation of health care. The

[31] *Department of Labour v Northland Health Ltd* (1997) DCR 611.

presence of ACC and government subsidised health care cause workers to change their behaviour, taking less care than if ACC did not exist and they had to pay all of their health care costs.

Overall, it is clear that at least some of the assumptions behind the ex post liability regulation models do not hold in practice in New Zealand. This means that blind unthinking policy conclusions drawn from the models for mitigating any failures of the market to provide adequate workplace care may not work. Consider the available evidence about the effect of government health and safety regulations overseas. This evidence suggests that even very tough regulations do not necessarily lead to safer workplaces. Econometric tests of the theoretical literature have provided mixed results. Since the United States has had specific regulation since the early 1970s, there are a large amount of empirical studies analysing the impact of OSHA, the United States regulator. Viscusi (1992) fails to find a significant impact of regulation on health and safety investment, planned health and safety investment and injury rates between 1972 and 1975. McCaffrey (1983) finds no significant effect on inspected manufacturing firms' lost workday rates between 1976 and 1978. Not all the studies have found a complete lack of effect, though. Cook and Gautschi (1981) find a significant drop in lost workdays because of accidents in Maine manufacturing firms between 1970 and 1976 and Viscusi (1986) finds a "modest" decline in accident rates during the period 1973 to 1983, which he attributes to OSHA. In summary, the general consensus is that if OSHA has had an effect on health and safety outcomes, then that effect has been small. This is the same conclusion drawn by Mears and Chapple (1996) for the DOL in a literature survey of the international evidence about government intervention and workplace safety. They were quite clear that the evidence showed that government intervention of whatever form changed employer behaviour but had little impact on overall workplace accident rates. We know of only one formal study addressing anything like this question for New Zealand, that of Mare and Papps (2000) who use the DOL administrative database of all DOL activities for the period July 1993 through to June 1997 as their source of data for risks and interventions. Their findings are similar to those in the international literature, with government regulation, in this case the HSEA, found to have no significant or conclusive impact on occupational health and safety outcomes.

So what if the features of the New Zealand economy do not support the blanket application of the types of models which form the analytical framework for devising the HSEA. What does it matter? The studies make no attempt to determine the costs of regulation but if a relatively small improvement in health and safety is achieved for a

large cost, then the overall welfare of a country will have fallen. The implication being that care needs to be taken in thinking how to use models to develop policies for specific situations if a government truly wants to improve the welfare of a society.

4. Policies need to be based on sound facts as they tell you if any intervention is needed at all.

Another implication from the experience with the HSEA amendments has to do with the necessity for intervention at all. The stated objective of the amendments was to reduce New Zealand workplace injury and death rates to those of Australia and the United States. Even if employees and employers responded to the amendments to reduce workplace accidents it is possible that the rates of workplace injuries and deaths in New Zealand could naturally be different from those in Australia or the United States. The three countries have fundamentally different economic characteristics. The countries have different proportions of their workforces in different occupations, and different occupations have different accident and health risks. Proportionately more people in New Zealand are employed in higher risk occupations than in Australia or the United States. Feyer et al; (2001) finds that New Zealand has proportionately more employees in the agriculture, forestry, and fishing industries than Australia and the United States where the fatally injured rates are very high. This compares to say services where the fatality rates are much lower, with employment in this sector in New Zealand relatively less than in Australia or the United States.

The percentage of employees employed in small firms (0-19 employees) is highest for New Zealand, least for the United States, with Australia closer to New Zealand than the United States.[32] Given that injury rates are lower for larger firms than smaller firms this would lead us to expect higher accident rates in New Zealand than Australia and the United States. There are many other differences in workplace characteristics which affect injury rates which may differ between New Zealand, Australia, and the United States, and which have to be taken into account in comparing them. Education levels (negative impact on injury rates), workforce turnover rates (positive impact), capital intensity (positive impact), all affect the underlying accident rate.

A major factor that has been found to be highly positively associated with expenditure on health and safety is the wealth of a country. For example, Viscusi et al (1997) find that as the average level of wealth in the United States has increased, so too has expenditure on safety and health with an associated decrease in accident rates.

[32] Ministry of Economic Development (2003); and *SMEs Internationally*, Ministry of Economic Development. Available. Online:http://www.med.govt.nz/irdev/in_ dev/smes2002/smes2002-14.html. 25 October, 2002.

In 2000, gross domestic product per capita in 1995 United States purchasing power parity dollars for New Zealand was $18,631, compared to $24,708 and $32,629 for Australia and the United States, respectively.[33] Given that the United States is wealthier than Australia which is wealthier than New Zealand, and expenditures on preventing workplace accidents seems to be a positive function of wealth, this factor alone could account for differences in injury and deaths rates between New Zealand, Australia, and the United States.

Other differences exist in the extent of legal liability, the types of worker compensation schemes in the countries, and union membership rates, all of which have been shown to affect workplace accident rates. What these show is that comparing accident, injury and fatality rates across countries as though the countries are identical in all respects can lead to policy intervention where none is needed and a lack of policy intervention where it is needed. It also implies that some types of policy objectives, such as equalising workplace fatality rates across countries may be unobtainable or at least inefficient.

5. Data shortcoming problems mean policies and intervention are not based on facts but are based on speculation and for whatever reasons suit the government of the day

The last point arising from the amendments returns us to the quote by Sherlock Holmes at the beginning of this paper, that it is a "capital mistake to theorize before one has data". In contrast to countries such as the United States or Australia, New Zealand has a very limited amount of data on workplace health and safety. The stated motivation for the amendments was the preliminary work of Feyer et al (2001), an exercise in describing the basic characteristics of fatal injuries in New Zealand from 1985 to 1994. This study included only two years of data from when the HSEA was in force, was not a study of the causes of the fatalities and would seem to be unsuitable for making strong inferences about the impact of the HSEA on health and safety outcomes and thus any deficiencies in it. Tellingly, the authors complained about a lack of data concerning occupational health and safety outcomes, both the quantity and quality of it. This frustration about the lack of data about workplace safety just echoed Wren (1997) who mentioned a report by the Parliamentary Labour select committee in which it was commented that occupational injury statistics for the last twenty years had been notable for their non-existence. Mare and Papps also complained about the lack of data on workplace safety, in their case the lack of matching firm level characteristic data. The lack of data about New Zealand workplace safety casts doubt on the validity of any beliefs about the state of health and safety in New Zealand (then or now), that the

[33] Organisation for Economic Cooperation and Development, National Accounts for OECD Countries. Table B7.

government needed to intervene at the time, and that the amendments were policies that would improve workplace safety and social welfare. The vacuum created by the lack of data means policies are not formed based on facts but for other reasons including whatever suits the policymakers' interests. For example, the policies of allowing DOL to impose on-the-spot fines for minor violations of the HSEA, the greater emphasis on employee involvement regarding health and safety, and stress and fatigue as needing greater emphasis in the HSEA, were all advocated without any factual basis and for anyone knows could have worsened workplace safety rather than improve it.[34] The implication from this aspect of the amendments is that the government should do all it can to collect and make public as much data as it can about the workings of a society. Only this way can theories be made to suit facts instead of the twisting what little facts there are to suit theories, and governments intervene when they can do good in ways that improve people's lives. At the moment it is not clear that this is the situation with health and safety in New Zealand.

[34] See, respectively: *The Evening Post*, (1999), 10 December, p. 16; *NZ Business*, (1994), July, p. 31; and *The Evening Post*, (1997), 26 May, p. 14.

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Appendix 1. Accident Compensation Corporation

A1.1 Definitions and Data

The injury and fatality data used in this paper are collected and administered by the ACC who provide the following information about them. New Claims recorded by ACC are in one of three main categories: new claims registered of which more than 90% are for primary care only (general practitioners, emergency room treatment, and such like); new entitlement claims are claims requiring compensation and/or support for returning to independence (such as home support and assistance to return to work); and new weekly compensation claims (claims paid income maintenance during time off work). The entitlement claims statistics largely exclude those accidents resulting only in incapacity during the first week (for which ACC is not liable) and or in medical treatment (for which the healthcare provider is normally reimbursed directly). Entitlement claim statistics also exclude injuries (even fatal ones) sustained by non-earners, unless compensation has been paid. This applies particularly to children and older people. A claim is defined to be new in the year the first entitlement is paid. If entitlement payments are received in subsequent years the claim will be ongoing in subsequent payment years. Injuries that are wilfully self-inflicted (this includes death by suicide), are excluded from all entitlements unless the claimant was suffering from a mental injury arising from a previous physical injury or they were suffering from mental or nervous shock due to sexual abuse.

There are six possible accounts into which accident based injuries are coded. The *Work Account* covers all work-related injuries and is funded from levies paid by employers and self-employed. These were previously known separately as the *Employers Account* and the *Self-Employed Account*. Under previous legislation, employers were required to take out accident insurance cover with private insurers for the period from 1 July 1999 to 30 June 2000. The Accident Insurance Amendment Act 2000 reinstated ACC as the default insurer for workplace accidents after 31 March 2000. Most private insurance contracts expired on 30 June 2000. The *Residual Claims Account* covers the cost of work-related injuries sustained before 1 July 1999 and non-work injuries to earners before 1 July 1992 and is funded from levies paid by employers and self-employed. The *Motor Vehicle Account* covers all personal injuries involving motor vehicles on public roads and is funded from petrol excise duty and a levy collected with motor vehicle relicensing fee. The *Earners' Account* covers non-work injuries (including at home, and

during sport and recreation) to earners and is funded from earners' levies plus self-employed levies based on earnings. The *Non-Earners' Account* covers injuries to people not in the paid workforce such as students, beneficiaries, older people, and children and is funded by the government. The *Treatment Injury Account* covers injuries arising from treatment and is funded from the earners' and non-earners' accounts.

A1.2 Regulation Changes

A list of regulatory changes to the operation of the ACC can be found on the ACC website from which the material below is taken. The changes that are relevant for studying the impact of the HSEA amendments are listed below with short summaries of them. The Accident Compensation Amendment Act 2010 is ignored given how recently it was passed.

Injury Prevention Rehabilitation and Compensation Act 2001

The Act maintained the entitlements then in effect. It gave greater emphasis on injury prevention and rehabilitation as primary functions of ACC, as well as reintroducing lump-sum entitlements for permanent impairment. The Act provided for an information manager to be appointed to oversee the collection of data from different government agencies and access to it . Most of the provisions in this Act took effect from 1 April 2002.

The Injury Prevention, Rehabilitation, and Compensation Amendment Act (No. 2) 2005

The Amendment Act removed the burden of proof for those injured from medical treatment to prove that a health professional had made an error, only that they had been injured during the course of treatment. Another change was to allow newly self-employed people, or shareholder-employees, to use their wages or salaries during the 52 weeks before they were injured to calculate their weekly compensation. The Act allowed ACC cover to clients who have a mental injury arising from sexual abuse that occurred before 1974 and opened up cover and entitlements to people who were first treated for mental injury as a result of sexual abuse from 1 July 1992 to 30 June 1999 (during this time, the Accident Rehabilitation and Compensation Insurance Act 1992 was in force that excluded these people from cover, and from taking civil action). Among other changes, the ACC established a dedicated patient safety function as a means of enhancing the role previously played by the Medical Misadventure unit, and

fungi poisoning and twisting injuries were added as injuries. The provisions under this amendment came into effect from 1 July of 2001.

The Injury Prevention, Rehabilitation, and Compensation Amendment Act 2008

The Amendment Act removed some of the barriers to cover for work-related gradual process diseases and infections. This was primarily by increasing the amount of non-work exposure an affected person is allowed when applying for cover for a work-related gradual process claim. It also clarified that ACC was responsible for investigating whether the client should be covered or not people who experience mental trauma at work and have developed a mental injury. People who self-harmed after 1 August 2008 were no longer be barred from entitlements. Nurse practitioners gained the right to assess people for their or inability to work and could sign medical certificates. The length of time injured could potentially get vocational rehabilitation was extended past three years. Occupational assessments had to take into account an injured person's pre-injury earning level when identifying potential employment opportunities. Most of the Act's provisions took effect from 1 August 2008, with the exception of provisions that related to witnessing a traumatic event at the workplace and changes to eligibility for vocational rehabilitation. These came into effect on 1 October 2008. Provisions relating to changes in the determination of minimum weekly earnings came into force on 1 July 2008.