Factors Affecting Return to Work after Injury: A study for the Victorian WorkCover Authority*

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Melbourne Institute Working Paper No. 28/02

ISSN 1328-4991 (Print)

ISSN 1447-5863 (Online)

ISBN 0 7340 3111 4

December 2002

* The work reported here was supported by The Victorian WorkCover Authority. This research was funded by The Victorian WorkCover Authority (VWA). Their advice and funding is gratefully acknowledged. However, the views expressed in this paper are those of the authors and not those of the VWA. The research reported in this paper commenced whilst the first author was based at Monash University.

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Abstract: Speedy and efficacious return to work of recovered or recovering workers is a central objective of workers compensation authorities. However, many of the factors that facilitate return to work are not well understood. This paper aims to shed light on these issues by utilizing a sample from the administrative records of workers compensation claimants in Victoria for the financial years 1993/94 to 1997/98. We separately model payments made as pensions (weekly payments) and payments made as lump sums to meet medical purposes (non-weekly claims). Two part model specifications are employed to model both the incidence of a payment and the duration or amount of that payment. The results show that claimant characteristics, characteristics of the accident, industry, employer and insurer characteristics influence the incidence, duration and cost of workers compensation claims.

J.E.L. Classification: **J28, C21, C41**

1. Executive Summary

1.1 Aims

The factors affecting the nature of claim behaviour and the opportunities for return to work among workers compensation claimants are examined using a sample of the Victorian WorkCover Authority's administrative database

1.2 Research method

The administrative database provides a complete though partial record of claimants and the circumstances of their claims over a period of 15 years. The database is analysed in various ways to elucidate issues relating to return to work of recovered workers. A hierarchical research strategy is adopted in which a sample of the claimant records are first analysed descriptively drawing attention to their main characteristics. Comparisons of subsets of claimants are presented to investigate the effect of particular characteristics of interest, such as the effect of belonging to industry and subindustries. A multivariate analysis is then undertaken to isolate the independent effect of factors of interest.

The multivariate analysis involves the construction of models in which first the probability of a claim occurring is determined and then its likely duration or cost. The two step nature of the models then requires the development of procedures to show the effects of changes in the characteristics on the incidence and duration or cost of claims. Survivor functions that show the relationship between the probability of claims and their duration for selected characteristics are also constructed.

1.3 Results

Descriptive analysis

The analysis was undertaken with a sample of records of 50,000 claims lodged in the period 1st July 1993 and the 30th June 1998. This was about one third of all of the claims lodged in this period. Males constituted about two-thirds of the sample of claimants. Given differences in type of injury, occupation and industry the sample was split into male and female claimants for much of the analysis. Analysis was generally undertaken separately for weekly payments (where claims are directly dependent on time, that is the number of days off work) and non-weekly payments (where claims that don't directly depend on the number of days off work such as lump sums for medical, hospital and legal expenses).

The data are very skewed in a number of important respects, with many claims being of very short duration and low cost, and few observations with very long duration and very high cost. Nevertheless the simple comparison of groups of claimants revealed large variation in incidence, duration and cost, between industries, by affliction type, by incident type and between agents. This variation occurs among weekly payments and non-weekly payments.

The factors affecting weekly payments were examined in more detail. When zero length claims were omitted from the sample apparent differences in mean length of claim for claimants in different industries were compressed. Instead variation in duration of claims within industries became an apparently more important factor. The large variation in duration of claims within groups remains when industries are broken into sub-industries although there is greater variation in means.

Multi-variate modelling

In none of the above analysis is the independent effect of other claimant characteristics controlled so conclusions about apparent differences between groups may be misleading. In the multivariate analysis we distinguish the independent effects of four categories of variable: characteristics of claimants, characteristics of injuries, characteristics of employers and characteristics of agents.

The multivariate analysis revealed significant independent effects of all of the above classes of variables. For this analysis separate models were developed for males and females.

- All models had good levels of overall fit and contain factors that are (jointly) significant.
- For the duration regressions there was negative duration dependence. That is, the probability of the spell ending (returning to work) decreases with the length of time on benefit.
- The employer size variable was negative or insignificant in most regressions, as expected, indicating that large employers do better.
- Age was strongly positively correlated with incidence and duration of weekly payments
- The timeliness variables were helpful in explaining duration of weekly payments for both males and females- the longer the delays the greater the duration of payments

- The medical intervention variables were also helpful in explaining duration of weekly payments for both males and females.
- There was some variation in the relationship between insurers/agents and incidence, considerably more in regard to duration.

1.4 Marginal analysis

Sensitivity analysis was undertaken to show the effect of selected changes in various characteristics on the incidence and duration of weekly payments. While shifting to Agriculture was associated with an increase in both the incidence and duration of weekly claims for both males and females, shifting to Community services was associated with falls in incidence and duration for females and a very small increase in incidence for males but a large fall in duration.

Changing agent, from the base case Agent A to Agent B, resulted in increased likelihood of incidence and duration for females and a small reduction in incidence for males but a large increase in duration. An increase in the claimant age resulted in an increase in the incidence and duration of weekly payments for both males and females. Increasing the size of the employer was associated with small falls in claims incidence and duration among males and females.

By far the biggest increase in duration was brought about when the classification of the severity of the injury was changed. When the category was changed from no current work capacity to serious injury there was a dramatic increase in duration for both males and females leading to very large increases in cost.

The importance of timeliness was illustrated in the effect of reductions to the statutory limits of the times between injury and employer notification, between employer notification and agent acceptance of the claim and finally the time lag between agent acceptance and first payment received by the claimant. The effect of reductions to the statutory limits led to falls in duration of about 6.5 per cent for both females and males.

1.5 Discussion

The literature reported in the paper indicated a large and growing research agenda in the US exploring factors related to claims. Most of the research reported emanated from purpose-designed projects to investigate particular aspects and some of the most convincing work was expensive involving matched trials. The overseas research suggests that claims behaviour is affected by employers, agents and the nature of medical provision.

The WorkCover claimant administrative data set provides a rich and extensive source of information for studying factors associated with workers compensation claim behaviour. However unavailability of some key variables may compromise multivariate analysis using this dataset. The return-to-work surveys provide information on employment conditions upon return to work that may usefully complement the claimant data if the survey responses can be matched.

This report has had the primary aim of shedding light on factors affecting claimant characteristics and the return to work of claimants. This has been interpreted as the development of models to explain incidence, duration (in the case of weekly payments) and amounts of compensation paid in various forms.

The results suggest that robust models of claim behaviour may be modelled using the administrative data set. The models capture many of the desirable features suggested by previous research and from institutional knowledge of claim behaviour. In particular a role for employers, agents and providers in influencing outcomes has been demonstrated.

However some limitations of the research method have also been noted. For instance there is no direct observation of return to work and while cessation of weekly payments is synonymous with return to work in most cases there will be important situations where this is not true.

The models explain the incidence, duration and amount of claims. They are useful for planning purposes. A greater contribution to policy formation would be possible if the links with behaviour were further drawn out with more research focussing on obtaining better measures of client, employer and agent characteristics.

2. Introduction

Speedy and efficacious return to work of recovered or recovering workers is a central objective of workers compensation authorities (see for instance Victorian WorkCover Authority (VWA), 2000). However many of the factors that facilitate return to work are not well understood. This study aims to shed light on these issues by utilising the administrative records of workers compensation claimants. The administrative records are those of the VWA for the financial years 1993/4 to 1997/8.

For a number of years the Victorian WorkCover Authority (VWA) has used a statistical case estimate (SCE) model to estimate claims duration and costs at the claimant level utilising this data source. The SCE modelling provides a sound and timely base from which to further develop the modelling framework in relation to return to work. However while the focus of the study is return to work it should be noted that return to work is not observed directly in the data. What is observed is that claimants no longer receive weekly payments. It is surmised that, for those of workforce age, going off benefit is tantamount to return to work. However there are other possibilities. For instance claimants may not return to work but become recipients of federal disability payments. In this report we abstract from such concerns.[1]

The broad aim of this research project is to consolidate VWA's understanding of factors that influence return to work for injured workers. In particular we shall further develop VWA's understanding of the factors influencing claims costs and duration for key system participants by developing and experimenting with different types of econometric models. The duration of claims provides the means of explaining return to work.

2.1 Previous related studies

Australian work

Facilitating early return to work, especially through vocational rehabilitation, is a theme common to all workers' compensation authorities in Australia (Purse 1998). Despite this, there has been relatively little empirical research in Australia that has attempted to model the factors influencing early return to work, let alone identify the role of rehabilitation in that process. Indeed, we are aware of only two published studies using Australian data that touch on the issue of claimant behaviour, and in one of those (Wooden 1989) the results on duration of claims were consigned to a footnote. Further, this analysis used aggregated time-series data and hence could not investigate behaviour of individual claimants. Instead, the focus of this study was on the role of overall economic activity and the level of workers' compensation benefits. Very differently, Wood et al. (1999) made use of a linked sample of general practitioners (GPs) and workers' compensation claimants to investigate the influence of GP interventions on return-to-work outcomes. Their findings indicated that GPs who were 'proactive' in their relationship with employers delivered superior outcomes.

Employer's role

The extension of the model to incorporate possible agent (insurer) and employer related explanators of claim cost and duration is likely to be of considerable benefit in determining policy in relation to the incentive structures under which employers and agents operate.

Several research studies have identified the importance of the employer's role in facilitating return-to-work and workplace-based rehabilitation. In a study of 220 Michigan firms, Habeck, Hunt and VanTol (1998) investigated the influence of firms' disability prevention and disability management attributes on claim incidence and duration rates. One of the study findings was that there was a higher level of variance in lost workdays due to workplace injury *within* an industry cluster than *between* different industries, suggesting: "risk due to industry type may be mediated by different responses to these risks at the firm or establishment level". Another key finding of the study was that factors within the control of employers such as the extent of commitment to proactive return to work planning were associated with differences in claim outcomes, "One standard deviation higher self-rating on Proactive RTW program was associated with 16% fewer lost workdays per 100 employees". This study did not control for differences at the claimant level such as injury type, age and sex.

In one of the few randomised clinical trials in this area, the relative impact of clinical and occupational interventions was investigated (Loisel et al, 1997). This study tested a model of management of subacute back pain to prevent prolonged disability. Workers from eligible workplaces who had been absent from work for

[1] However this is not to diminish the problem. The issue of 'cost shifting' between state and federal jurisdictions is a matter that deserves further study in its own right. Such study would be facilitated if it were possible to match VWA administrative records and federal government social security administrative records.

more than 4 weeks for back pain, were randomised, based on their workplace, into one of four treatment groups: usual care, clinical intervention, occupational intervention, and full intervention (a combination of the last two). The occupational intervention included patients' visits to an occupational physician and a participatory ergonomics evaluation. The ergonomic evaluation was a worksite review that included union and employer representatives in determining the need for job modifications. The full intervention group returned to regular work 2.41 times faster than the usual care intervention group. The specific effect of the occupational intervention accounted for the most important part of this result.

Repeated spells

In another study a significant proportion of injured workers who return to work subsequently experience further injury-related absence episodes (see Butler, Johnson & Baldwin 1995). Consequently the frequency of repeated spells is likely to be an important issue in regard to return to work.

Reporting of injuries

Lack of timely reporting of injuries may compound the seriousness and the costliness of injuries (California Department of Industrial Relations, 2000). In a review of early physician notification for workers with low-back injury, Hazard et al. (1997) reviewed several studies demonstrating the effectiveness of timely interventions. The importance of avoiding disability through appropriately targeted interventions is demonstrated in a study of WC low back pain claims. Hashemi et al. (1997) found that in general, half of the claimants who remain on disability at the end of "n" weeks will be off disability at the end of "6 x n" weeks. That is, half of the claimants who miss 1 week of work because of low back pain will be off disability at 6 weeks.

Early intervention strategies rely upon timely reporting of injuries. Pransky et al. (1999) identified a number of factors that contribute to employee under-reporting. They noted that under-reporting led to missed opportunities for identification of cases at an early and more reversible stage, which may contribute to higher overall injury costs. In a review of relevant measures for a balanced scorecard of managed care in the context of workers' compensation occupational health care, Harris (1998) included timeliness of care and time to see medical practitioner as key indicators.

Agents and claims management

The process of management influences cost and duration (see Gardner, Telles and Moss, 1996). The Industry Commission noted: "effective administration of claims is an essential element of timely and effective rehabilitation". The Heads of Workers' Compensation Authorities report (1996) identified the importance of an effective claims management function: "In relation to this (claims management) process, the quality of the primary adjudication function (the decisions made when the claim is lodged) has an important impact upon other elements of scheme performance."

Expediting the reporting of injuries to employers and in turn to agents is an important aspect of effective claims/injury management. Earlier notification enables agents to commence pro-active management of the claim to facilitate early return to work. In an unpublished study examining WC claims, Liberty Mutual Insurance Company found that when the first report time lag increases, disability duration and overall claims costs also increase. An injury reported 15-21 days after the accident will typically have 19% longer disability duration than an incident reported within 7 days (Margoshes, 1998).

From a broader perspective, the measure of time elapsed between injury and notification provides an indicator of the scheme's performance in providing benefits to workers in a timely manner. For this reason, the measure of days from date of injury to date of notification is often used as a benchmark indicator for workers' compensation schemes (for example, 'time to notice' and 'time to initial payment' are included as measures in the US Workers' Compensation Research Institute Benchmarks series, CompScope™).

2.2 The SCE model

The SCE model provides VWA with essential information on the factors that influence cost and claim duration at the individual claimant level for seven types of benefit. The SCE utilises survival analysis[2] to model claim duration in terms of the claimant's individual characteristics. The survival framework estimates the probability of a particular claim payment being alive at a point in time. Its use negotiates the problem that many spells are unfinished. Seven types of claim payments are modelled.[3] The survival models are combined

[2] Specifically Cox proportional hazards based survival analysis.

[3] The seven types of benefit are weekly benefits, medical rehabilitation costs, maims, pain and suffering, legal costs, medical-legal costs and common law costs.

with other generalised linear models concerning costs to estimate the outstanding liabilities of individual claims. The SCE model is currently being revised, updated and re-estimated by VWA.

The characteristics used to determine the outstanding claimant liabilities include:

- First date of weekly incapacity payments;
- Gender;
- Nature of injury
- Location of injury
- Occupation
- WIC code;
- Accident type; agency of accident;
- Pre-injury earnings;
- Employment type;
- Group exception code and
- Report delay.

The proposed modelling exercise will be complementary to the existing version of the SCE model and the ongoing work with the SCE model being conducted by VWA. In particular, the SCE model provides key information on the likely claim characteristics that influence claim duration and cost. The focus is, after controlling for claimant characteristics, on whether characteristics of either employers and/or agents influence claim duration and/or costs.

All of the most likely individual claimant characteristics available are included in the SCE modelling and have been listed above. Attention is therefore restricted to the additional variables that may be of interest, in particular those relating to employers and agents. We consider each of these in turn. In much of the discussion we have in mind using employer and agent variables to explain aspects of claimant incidence, duration (in the case of weekly claims), cost, and by inference, return to work behaviour. While speed of return to work is the ultimate objective we have no explicit observation of return to work, and in most cases where the claimant remains of workforce age, we assume that going off benefit is equivalent to a successful return to work.

2.3 Employers, agent and medical provider characteristics

Employer characteristics

Potential employer based factors are:

- Employer size
- Industry classification
- Workplace classification
- Employer premium experience
- Timeliness of notification to employer
- Timeliness of notification to agent
- Timeliness of medical intervention

Overseas studies (Galazzi and Boden, 1996) have suggested that larger employer's experience improved outcomes in relation to both claims and return to work. It is not clear whether size per se is important or is merely a proxy for better management practices. If the latter is true one would expect to see some correlation with other management practice variables.

Both industry and workplace classification are associated with higher or lower claims and return to work performance due to the intrinsic nature of the work associated with particular industries. For instance Manufacturing and Primary industry often involve the use of potentially dangerous equipment and will have higher claims than jobs in the service industry. Within the service sector jobs involving high levels of day-to-day contact in potentially confrontational or stressful situations such as teaching or social work, are likely to also be associated with higher levels of claims.

Employer premiums reflect previous risk experience rating. To the extent that it takes a long time to change employment practices, or that employers choose to operate with poorer work care practices premiums will be a good predictor of future claims experience. Premium risk is a control variable that has been used in overseas studies (eg Cheadle et al, 1999).

Timeliness of notification of employer (by claimants) may contribute to delays in commencement of return to work planning and rehabilitation. Similarly timeliness of notification of agents by employers will contribute to delays in the work planning and rehabilitation. Delays may be associated with exacerbation of conditions. They may also indicate poorer general work care management practices.

Timeliness of medical intervention may also be a useful indicator of employer practices. Delays between the date of injury and first medical intervention may indicate a lack of supportive organisational context, associated with a tendency to under-report until injury severity is exacerbated.

Agent and provider characteristics

Potential agent and provider-based factors are:

- Agent
- Agent size
- Time elapsed between employer notification to claim liability determination
- Frequency and range of medical interventions
- Referral to medical panel at any time
- Use of conciliation services at any time

In Victoria there are a small number of agents and it is possible to utilise the identity of the agent. The identity of the agent may be a useful control variable but it is unlikely to provide much economic information since we have little knowledge about the nature of the agents. Consequently while we are likely to find out that some agents specialise in higher cost claimants and others lower, without further information we can make little interpretation of this knowledge.[4] One piece of further information is size but as with employer size, it is not clear whether size indicates economies of scale or just acts as a proxy for other factors.

The time elapsed between employer notification and claim liability determination may provide an indicator of the efficiency of the agent. Delays in timeliness may limit scope for early intervention and may be symptomatic of an adversarial human resource management context.[5]

The number of medical providers used in a claim or by claimants may be an indicator of problems with a claim or claimants. Several workers compensation authorities have introduced limits on the frequency with which claimants are able to change provider.

Medical panel assessment and the use of conciliation services may be symptomatic of claim disputation and an adversarial context in which workers compensation claims are managed. More generally, anecdotal evidence mentioned in discussions with VWA staff has suggested that there is a strong correlation between the level of litigation and the cost and duration of claims. Unfortunately the administrative database contains no independent measure of litigious activity that may be associated with claims.

The characteristics of employers and agents listed here reflect information that is currently available. However it may be that the variables listed act as proxies for underlying variables that are not available. For instance it may be that employers with poor human resource management policies incur lengthier and higher cost claims than those with good human resource management policies. In the absence of a specific variable measuring human resource management, variables such as the timeliness of notification of agents may act as proxies for human resource management. If this were so the specification of claims would be greatly improved by use of a human resource management variable rather than a proxy.

2.4 In this report

It is useful to consider the nature of the WorkCover claimants. In the next section we outline some features of claims behaviour. Our data is gathered from the statistical material provided by the VWA at their website and from our sample of claimants.

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[4] This is particularly so in the dataset used in this analysis. Up until October 1998 anomalies in the regulations regarding the remuneration of agents may have led to perverse incentives whereby agents preferred to deal with employers with the poorest claims records.

[5] Early intervention provides a number of potential advantages for agents in expediting recovery from injury. For instance it enables agents to: more easily review the potential requirement for intensive intervention and case management; clarify key tasks including who should intervene, how and when; liaise with the treating medical practitioner to understand the nature of the injury, the prognosis and the expected return to work date; communicate with employers and injured workers on a timely basis to review strategies for return to work planning; and assess the likely need for provision of specialist interventions including occupational rehabilitation services.

In section 3.1 we provide an overview of workers compensation payments over time and in the most recent years for which we have data. The sample we use for the main part of our analysis is then described in section 3.2. Characteristics of claimants in our sample are presented in section 3.3. Here we undertake univariate analysis presenting means, standard deviations and case numbers decomposed by characteristic. The univariate analysis is extended in section 3.4 though attention is restricted to weekly claims. The focus is on duration and many claims of less than one day are omitted. Boxplots are constructed to show duration of claim among industries and sub-industries of interest. This completes the presentation of the descriptive material.

In Section 4 we then describe the modelling work that forms the basis of the multivariate analysis. The multivariate analysis utilises two step models in which first incidence is determined and then, given incidence either the duration (for weekly payments) or the cost is estimated. Results of the multivariate analysis are shown in Section 5. The main characteristics determining incidence, duration or cost are presented. We outline a procedure for estimating the marginal effects of changes in characteristics of interest and demonstrate the effect of particular changes. The report concludes in Section 6 with a discussion of the results, their limitations and ways in which the modelling work may be extended and improved.

3. Data and claimant behaviour

3.1 The VWA Database

Our sole data source is the administrative records of the WorkCover Authority. There are strengths and weaknesses of using such a source. The obvious strength is that we have at our disposal a census of a group under study and by drawing from this we can avoid errors associated with sampling such as biases in the selection process.

There are two potentially important problems with administrative records. They are very likely to be incomplete lacking important explanatory variables, and by their nature, they may not be a complete sample of the population of interest. The nature of the material kept in administrative data banks generally reflects the particular immediate needs of the authority. These needs are generally narrowly defined according to rules and regulations describing the proximate circumstances under which claims may be considered and dealt with. For instance, while there is a lot of information about injuries there is little contextual information about workplace arrangements or personal characteristics of claimants.

The second problem is that the data only includes representatives who have incurred some condition or injury whereas the population of interest may include both WorkCover claimants and those who do not incur injuries or conditions. Ideally we would like to have at our disposal a data set of the whole (workforce) population including both WorkCover claimants and non claimants. We could then consider a broader range of research issues such as the conditions that lead to the occurrence of a claim. In practice the administrative data base restricts us to economic questions that are predicated on the existence of a condition or injury, for instance, given a claim, how much will it cost, or for how long will it go. The major limitation of administrative databases is on the types of problems that may be considered for research and generally we can make no inferences to the population at large. Of course, there remains an important set of problems that can be tackled with the data set; the focus on return to work in this report takes as given the existence of a claim.

Some other data issues

The issue of sample size is an important issue in the modelling. VWA deals with thirty thousands claims per year and there are up to 15 years of data. Given the size of this database we have used a sample of the data in our work. To minimise the effect of structural breaks in relationships over time we will sample from the most recently available data. Many of these claims are still extant, so an issue is the way in which the data is censored.

A limitation of the database is that it does not actually identify whether persons who cease receiving benefits have returned to work or not. This problem can perhaps be handled by distinguishing shorter spells from the very long spells (greater than 104 weeks) on the grounds that it seems likely that persons who have only been in receipt of benefits for a short period will have little incentive to exit the system unless it is to return to work. That said, it must be recognised that this will depend on whether there is a job to return to, and as Purse (1998) has emphasised, employers do not always comply with the employment security measures contained in legislation. Further, such employment security provisions may not cover some types of employment.

A possible subsidiary modelling input is the linked *Return to work survey* and VWA database information. The questionnaire indicates the sort of information available. We have included some discussion of the potential of this data in section 6. Unfortunately checking and cleaning the Return to Work data and the process of linking with the existing VWA data base is likely to take some time and is not available within the timelines for this project.

As outlined in Appendix I there have been a number of legislative changes over the period from which data was available. The modelling of the effect of these changes on claim cost and duration is outside the scope of the study.

Recent VWA claims

The sample we use for most of the analysis is drawn from new claimant records of the Victorian WorkCover Authority over the period 1st July 1993 to 30th June 1998. Over this time there were an average of about 33,000 cases active each year. We took a simple random sample of thirty percent of this database yielding 52,124 cases.

The number of new cases each year was 37,777 in 1993/94; 32,684 in 1994/1995 33,227 in 1995/1996 32,367 in 1996/1997 and 30,639 in 1997/1998. The overall trend is of a fall in claims over the years represented in

the analysis. In the latest year for which the VWA have published data, 1998/99 female claimants made up 9197 active cases and male claimants made up 22143 active cases.

As shown in Table 3.1 claims can be classified into time dependant costs (weekly claims) and time non-dependent costs. Non-weekly claims include medical, legal and administrative payments and common law payments. For weekly claims the costs are connected to claim duration by rules defined by WorkCover largely related to the pre-injury earnings of the claimant but also dependent on the severity of the condition. For these claims an identity may be written to calculate costs from duration.

Table 3.1 Workers compensation payments, VWA, 1997/8 and 1998/9, $mill

	1997/8	1998/9
Weekly payments	313	318
Non-weekly payments		
Lump sums (mainly Common Law)	219	366
Maims	147	104
Medical and associated	168	169
Other (include legal, medical reports)	114	115
Total non-weekly	648	754
All claimant payments	961	1052

Source: VWA annual reports

In this population the average age of claimants was 40.2 years and the average number of days paid in compensation was 93.5. However a large proportion of claimants were not paid for any days lost and of those that did receive weekly payments the average number of days paid was 150 days.[6]

Of all claimants in 1998/99 a total of $318 mill was paid in weekly payments and $754 mill in non-weekly payments (lump sums, medical and legal expenses) to the 31,340 active claimants. Weekly payments were much the same as in the year before but non-weekly payments rose 16 per cent. Non-weekly payments would have risen more than 16 percent since lump sums (mainly Common law claims) rose a massive 67 per cent but this was offset by a fall in maims payments. The active claimants were paid an average of $10,130 in weekly payments and $24,031 in non-weekly payments.

The large rise in Common law payments is attributable to the existence of a statutory time limit for claims under previous common law legislation which expired during the 1998/9 financial year and caused the bringing forward of claims that otherwise might have occurred later. The fall in maims is likely to be associated with the increase in common law claims and be a consequence of legal activity switching away from maims during this year.

3.2 The sample

The original file contained 52,124 cases or claims (rows). We rejected cases where:

- the employer size was unknown (remuneration less than $7,500); and where
- there were conflicts in date variables leading to negative values for variables such as age at time of accident, number of days between accident and employer sign claim and number of days between employer sign claim and agent received claim.

We also restricted cases to those where the age at time of injury was between 15 and 75 years. This yielded a sample of 45,107 cases. For modelling this was further split between males (33,449 cases) and females (11,658 cases). Note that we will still have a number of situations where cell sizes will be too small to identify effects (*e.g.* for interaction terms).

Within the gender groupings the data is also "partitioned" according to our modelling strategy; for example into cases where the number of days compensated by VWA is positive and those where the number of days compensated by VWA is zero.

Table 3.2 presents summary information about the sample of claimants used in the analysis. It shows the average and median value for each class of claimant for a range of relevant variables. The information is

[6] Note that the weekly payments for the first ten days of work lost are met by the employer. Thus a claimant receiving 15 days of weekly payments will have actually been off work for 25 days. Similarly employers meet the first part of medical costs. This excess is indexed each year and in 2000 was $430.

presented separately for males and females. The nature of WorkCover injuries and conditions are sufficiently different for males and females to warrant separate modelling. The statistics in Table 3.2 support this contention; on average females appear to have longer periods off work, to work for larger businesses and to earn less at the time of injury.

The last three variables listed in Table 3.2 relate to timeliness matters. The first shows the time between injury and employer receipt of claim, the second between employer receipt of claim and agent notification and the third between agent notification and time of first payment. The data show that there are quite long waiting periods in each of these steps.[7]

The highly skewed nature of the results is apparent from the comparison of the mean and median values for many of the variables. While the average days paid for time lost off work was 96 the median (ie the middlemost observation) was only 3 days. Similarly while the average weekly compensation was $5674 for females the median cost was only $169. There are very many claims which incur no time lost and a few that incur months and years of time lost.

Table 3.2 Summary statistics, WorkCover sample, means and medians

	Female		Male	
	Mean	Median	Mean	Median
Time lost off work paid by WorkCover (days)	96	3	64	1
Weekly pay of the worker at the time of injury ($)	425	412	470	475
Employer Size ($mill)	144.7	8.0	67.7	3.5
Age of claimant (years)	39.8	40.8	39.9	39.3
Annual total weekly compensation payments ($)	5674	169	5110	38
Annual total non-weekly compensation payments ($)	15013	1264	14678	1305
Time between injury and employer signed claim (days)	58	18	53	14
Time between employer signed and agent receipt of claim (days)	25	8	23	8
Time between agent receipt of claim and first payment (days)	96	38	77	30
Number of observations	11658		33449	

Source: WorkCover sample

3.3 Some claimant characteristics

The nature of claims is shown in the cross-tabulations of various claimant characteristics and average amounts of weekly and non-weekly compensation payments in Tables 3.3 to 3.9. [8]

Table 3.3 shows the means, measure of variation and percentage of claims for weekly payments for each industry. Leaving aside the industries with few observations the highest mean payment was for $7140 for Manufacturing and the lowest was $2979 for Public Administration. Among males the highest was $7932 for Agriculture and the lowest was $4207 for Community services.

[7] In discussion of these results it was suggested that the long lags may be a consequence of a few observations in the relatively minor category of disease however when the data were disaggregated by disease and all other conditions the long mean lags remained in both.

[8] Note that the percentages of cases in tables of weekly and non-weekly claimants by industry inTables 3.3 and 3.4 respectively, will be the same since all weekly claimants are also non-weekly claimants. Similarly the percentage of cases by injury type for weekly and non-weekly payments shown in Tables 3.5 and 3.6 are the same.

Table 3.3 Weekly Compensation payments by industry

Industry at time of injury	Female Mean ($)	Female Std dev /mean	Female Per cent of cases	Male Mean ($)	Male Std dev/ mean	Male Per cent of cases
Agriculture	6676	2.1	1.9	7932	2.8	2.6
Mining	849	1.7	0.0	5957	3.3	0.6
Manufacturing	7140	2.2	19.9	4499	3.0	32.9
Electricity, Gas & Water	1996	2.6	0.2	3128	5.0	1.9
Construction	10043	2.2	0.7	7024	2.8	12.2
Trade	6047	2.6	11.2	5450	2.8	14.0
Transport & Storage	7822	2.7	2.0	5630	3.0	9.3
Communication	4084	2.7	0.1	2299	1.7	0.1
Finance, Property & Business	6851	2.7	6.8	5370	3.1	4.1
Public Administration	2979	3.1	3.1	4378	3.1	1.3
Community Services	4837	2.8	45.8	4207	3.6	15.4
Recreation, Personal & Other	5308	2.7	8.3	4617	3.4	5.5
All industries	5674	2.6	100	5110	3.1	100
Number of observations			13072			39052

In our discussion of the literature we noted a study that reported much greater variation between payments within industries compared to across industries (Habeck, Hunt and VanTol, 1998). In the third and sixth column we show the ratio of the standard deviation to the mean. This is a measure of the degree of variation in the data. There was greater variation in average weekly payments to males between industries that there was for females.

In Table 3.4 we show how average non-weekly payments vary with the industry of the injured worker. Table 3.4 indicates that the female claimants worked primarily in the community service and Manufacturing industries while male claimants worked mainly in Manufacturing, Community services, Trade and Construction. The average size of payments was fairly similar across industries in which there were sufficient numbers of claims to be robust. The average claim for non-weekly payments was 15013 for females and 14678 for males. Apart from a couple of industries with very few claimants (Mining, Electricity gas and water, Construction (females), Public administration (males) and Communication the mean payments for females in the remaining industries varied in a tight range from $12217 to $22606 for females and from $7565 to $20576 for males.

Table 3.4 Non-weekly Compensation payments by industry

Industry at time of injury	Female Mean ($)	Female Std dev /mean	Female Per cent of cases	Male Mean ($)	Male Std dev/ mean	Male Per cent of cases
Agriculture	19674	4.2	1.9	20576	4.1	2.6
Mining	3126	1.1	0.0	20329	3.5	0.6
Manufacturing	22606	2.9	19.9	17619	3.6	32.9
Electricity, Gas & Water	2820	1.6	0.2	10467	3.9	1.9
Construction	17612	2.5	0.7	15289	3.7	12.2
Trade	15389	3.2	11.2	16190	3.7	14.0
Transport & Storage	13398	2.9	2.0	15046	3.6	9.3
Communication	23871	2.8	0.1	7152	1.6	0.1
Finance, Property & Business	15144	3.4	6.8	14333	3.6	4.1
Public Administration	6563	2.9	3.1	11395	3.9	1.3
Community Services	12218	3.7	45.8	7565	4.6	15.4
Recreation, Personal & Other	13998	3.5	8.3	10445	4.3	5.5
All industries	15013	3.4	100	14678	3.8	100
Number of observations			13072			39052

As in the previous table we report the ratio of the standard deviation to the mean as an indicator of variation within and between groups. Among males the values are relatively uniform across industries indicating that most variation occurs within industries rather than between them. However there is some noticeable variation across industries among female claims. We shall examine the matter of within industry variation in more depth in the next section.

Table 3.5 shows how average weekly payments vary with affliction. The most important category was sprains and strains contributing two-thirds of female claims and just over half of male claims. Leaving aside deafness for which there are not sufficient observations for interpretation, the average claim size varied quite markedly across affliction type. Whereas musculo-skeletal injuries, multiple injuries and stress led to average claims in excess of $10,000 there were many affliction types which led to payments of less than $5000. As with non-weekly payments there was quite a degree of variation across affliction types particularly for males. The most important afflictions were musco-skeletal diseases, multiple injuries and stress for both males and females. Dislocations and circulatory disease were important male afflictions but not female afflictions and the reverse was true for superficial injuries.

Table 3.5 Weekly compensation payments by affliction

	Female			Male		
Affliction	Mean ($)	Std dev /mean	Per cent of cases	Mean ($)	Std dev/ mean	Per cent of cases
Deafness	0	1.4	1.3	7	30.6	8.4
Sprains & Strains	5615	2.5	66.6	6262	2.8	50.3
Open Wounds	2269	3.4	3.8	2377	3.9	9.7
Fractures	4700	2.9	5.8	6128	2.6	8.0
Contusions	5177	2.9	4.5	4421	3.5	5.5
Musculo-Skeletal Diseases	10437	1.3	0.4	13783	2.0	0.4
Dislocations	1737	2.0	0.5	7576	3.0	0.6
Internal Injuries	3497	2.9	0.5	2314	2.1	4.4
Superficial Injuries	4705	3.4	0.6	806	6.5	2.4
Burns	1325	2.9	0.7	2673	4.3	1.1
Multiple Injuries	11215	2.7	0.5	10098	2.5	0.5
Stress	10954	2.2	7.4	10885	2.3	3.4
Circulatory Disease	857	2.8	0.2	7273	3.1	0.8
Skin Diseases	2194	2.8	0.7	2756	3.9	0.4
Other Injuries	5456	2.5	6.6	6254	3.1	4.0
All afflictions	5674	2.6	100.0	5110	3.1	100.0

In Table 3.6 we show how average non-weekly payments vary with the affliction of the injured worker. Around half all male afflictions were classified as strains and sprains and about two-thirds of female afflictions. There were other gender related differences in the pattern of affliction. Deafness, Open wounds, fractures and contusions were all more important among male claimants whereas stress was more important among female claimants.

Table 3.6 Non-weekly compensation payments by affliction

Affliction	Female			Male		
	Mean ($)	Std dev /mean	Per cent of cases	Mean ($)	Std dev/ mean	Per cent of cases
Deafness	2604	1.4	1.3	5970	1.3	8.4
Sprains & Strains	16934	3.3	66.6	17663	3.5	50.3
Open Wounds	7958	3.9	3.8	10375	4.6	9.7
Fractures	11914	3.8	5.8	17086	4.0	8.0
Contusions	15859	3.6	4.5	13013	4.4	5.5
Musculo-Skeletal Diseases	40091	2.9	0.4	49653	2.2	0.4
Dislocations	2954	1.8	0.5	15465	3.5	0.6
Internal Injuries	10583	4.7	0.5	3886	4.6	4.4
Superficial Injuries	8874	4.4	0.6	3255	6.2	2.4
Burns	9832	4.0	0.7	15944	5.0	1.1
Multiple Injuries	23458	2.5	0.5	42037	2.4	0.5
Stress	10941	3.6	7.4	10591	3.4	3.4
Circulatory Disease	6402	3.3	0.2	26489	2.5	0.8
Skin Diseases	1950	2.5	0.7	9259	4.6	0.4
Other Injuries	10867	3.1	6.6	16387	3.6	4.0
All afflictions	15013	3.4	100.0	14678	3.8	100.0

There was considerable variation in the mean level of payment according to affliction. For both males and females, Multiple injuries and Musculo-skeletal afflictions, though relatively unimportant overall, attracted large non-weekly payments. The most important form of affliction, Strains and sprains incurred the next largest non-weekly average payment.

The index of variation across cells indicates quite a lot of variation by affliction category. Whereas our index had an average value of 3.4 the value for female internal injuries was 4.7 while for dislocations it was 1.8. There was a similar degree of variation between groups among male claimants. The index ranged from 6.2 for superficial injuries to 1.3 for deafness.

Table 3.7 shows how average payments vary with type of incident that led to the claim. In this table we combine information for both males and females and weekly and non-weekly payments. We also show the percentage of cases in each category for males and females. The most important proximate cause of incident appears to be over-exertion, more so for females than for males. Other important causes included falls and claimants stepping on or being struck by an object. Some incident types, such as contact with electricity and explosion and implosion led to large average non-weekly and weekly payments for both males and females.

Table 3.7 Compensation payments by incident type

Incident Type	Female			Male		
	Non-weekly $	Weekly $	Per cent of cases	Non-weekly $	Weekly $	Per cent of cases
Fall of Person	16776	5241	16.9	16013	6145	14.2
Falling Object/Substance	20284	6484	1.0	19182	5445	1.8
Stepping on/Struck by Object	9677	4027	9.2	10195	3815	14.0
Caught	14810	3789	2.4	16768	3461	5.7
Overexertion	16716	5968	50.1	17066	6106	41.4
Exposure to extreme temperature	10643	1309	0.6	10219	2634	1.0
Contact with Electricity	24774	6751	0.2	38595	8147	0.2
Exposure to Toxic Substance	6175	233	0.1	7011	767	0.2
Explosion/Implosion	58192	8590	0.1	15447	1346	0.4
Repetition Injury	11987	6112	4.9	11821	4856	1.6
Other Types n.e.c.	10832	6116	4.2	12545	4497	5.1
Vehicle Accident	13759	6856	1.1	20491	8458	1.4
Unknown/Not Coded	10780	6589	9.4	9557	3092	13.0
All incident types	15013	5674	100.0	14678	5110	100.0

In Table 3.8 we report the weekly and non-weekly payments for males and females by agent. Among the firms with reasonable market share there was some variation in weekly and non-weekly payments for males or females. This does not indicate either poorer or less profitable performance by agents. It is more likely that some agents concentrate in particular industries and employers. Premiums vary according to both industry and employer so the profitability or efficiency of the insurer will be a function of both premiums and management of claims.

Table 3.8 Compensation payments by agent

	Female			Male		
Incident Type	Non-weekly $	Weekly $	Per cent	Non-weekly $	Weekly $	Per cent
Agent A	15561	5524	21.1	15425	4870	25.1
Agent B	11809	5580	13.8	12148	4770	13.8
Agent C	16577	5883	24.3	14321	4896	22.2
Agent D	14087	5766	17.6	15487	5944	17.0
Agent E	14087	6161	7.6	16291	5897	9.1
Agent F	13879	4602	1.7	9109	5871	0.3
Agent G	5614	2842	0.4	56518	7551	0.0
Agent H	20872	6296	5.8	17840	5870	4.3
Agent I	11142	4626	1.6	11208	3932	2.7
Agent J	18356	5936	3.4	12861	3801	3.2
Agent K	9483	3577	2.7	13797	4243	2.3
All agents	15013	5674	100.0	14678	5110	100.0

3.4 Variation in duration of weekly claims

An issue of particular interest is the extent of the variation in duration of weekly claims between and within industries. The mean and standard deviations of the weekly payments in Tables 3.3 to 3.6 provide some flavour of this across industries and afflictions. In this section we focus on within industry variation among four industries that have been identified as having high claims, Manufacturing, Construction, Transport and storage and Community Services.

Figure 3.1 Variations in duration of claims among industries

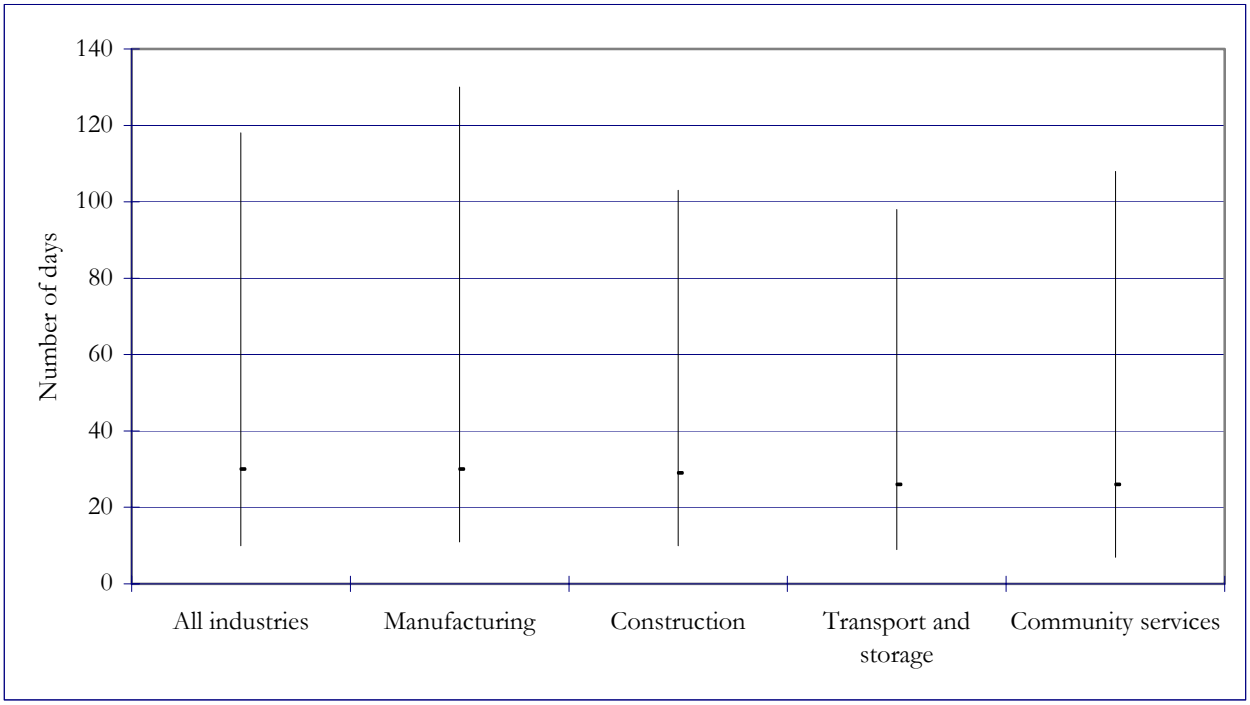


Figure 3.1 compares the average duration of weekly claims at the boundaries of first and second quartile (the lowest point on the vertical bar), at the mean (the dot on the vertical bar) and at the boundaries of the third and fourth quartile (the uppermost point on the vertical bar) for the four industries and for all industries. In preparing Figure 3.1 and other figures in this section, we omitted claims of less than one day. This had a strong effect on the average length of claim and tended to reduce much of the apparent variation shown in Table 3.1 between the four industries.

The striking observation about Figure 3.1 is the very wide variation within the broad industry groups compared to the variation between the four industries and for all industries together. For instance among all industries the lower quartile of claims are of duration about 10 days whereas the upper quartile is of duration nearly 120 days. However there is little difference in the mean duration of claims across industries with all around 30 days. Similarly the boundaries of the upper quartile are fairly similar varying from just under 100 for Transport and storage to about 130 for Manufacturing.

In order to pursue the issue further we show in Figures 3.2 to 3.6 similar plots for sub-industries within each industry. Figure 3.2 is concerned with five manufacturing sub-industries that have the highest rate of claims reported in VWA(2000b).

At this level of disaggregation differences begin to emerge between the sub-industries. The means remain fairly close but the upper quartile boundaries now exhibit larger variation. While the upper quartile starts at less than 100 days for Wood products and Leather, for Other non-metallic metals it starts at over 200 days.

Figure 3.2 Variation in duration of claims among subindustries of Manufacturing

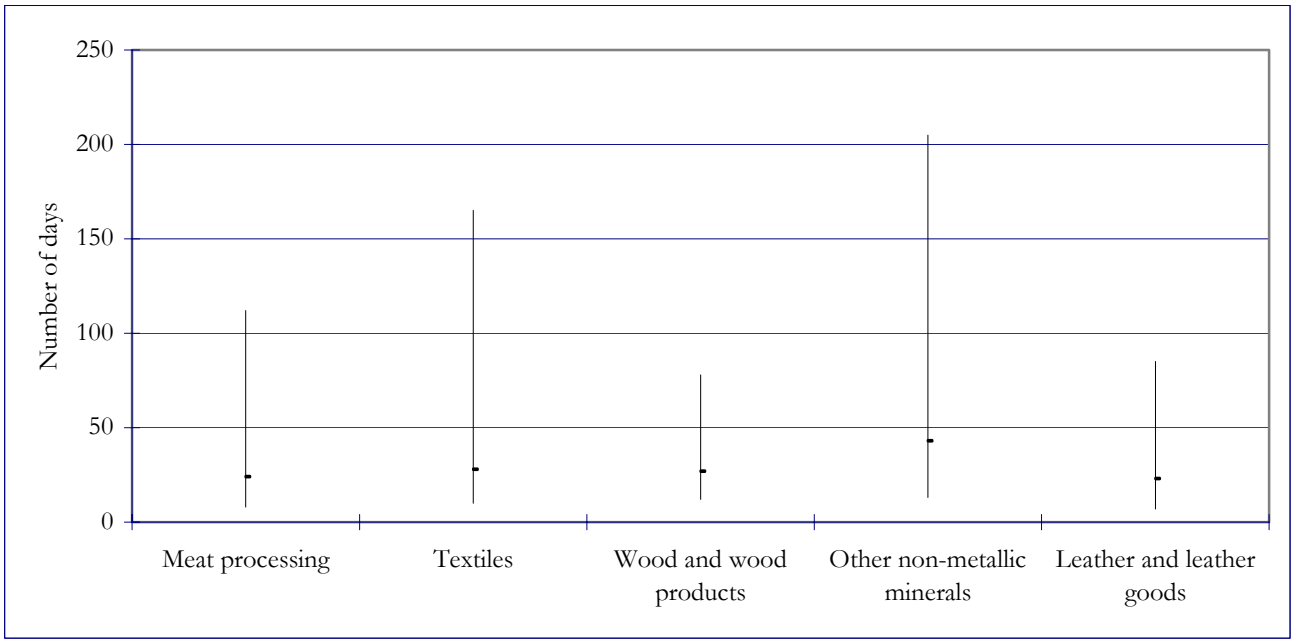
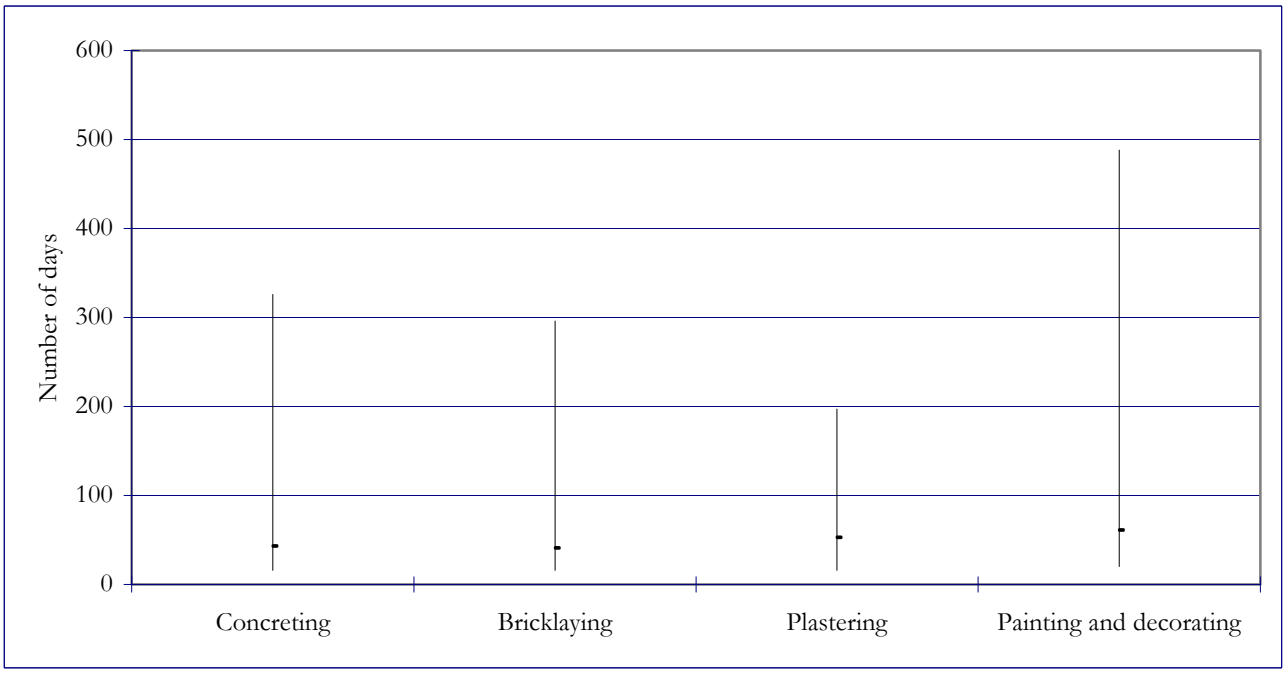


Figure 3.3 shows the variation in duration of claims among four sub-industries of Construction. For this selection we begin to see more dramatic differences, not so much in the means, which remain fairly close together, but there are now marked differences in the points defining the upper quartile. While in Plastering the upper quartile commences at around 300 days, for Painting and decorating it starts at close to 500 days.

Figure 3.3 Variations in durations of claims among Construction subindustries



In Figure 3.4 we show the variation in the duration of claims among sub-industries of Transport and storage. With this particular group of sub-industries there is little obvious variation between sub-industries and as at the industry level most variation occurs within each of the sub-industries.

Figure 3.4 Variations in duration of claims among subindustries of Transport and storage

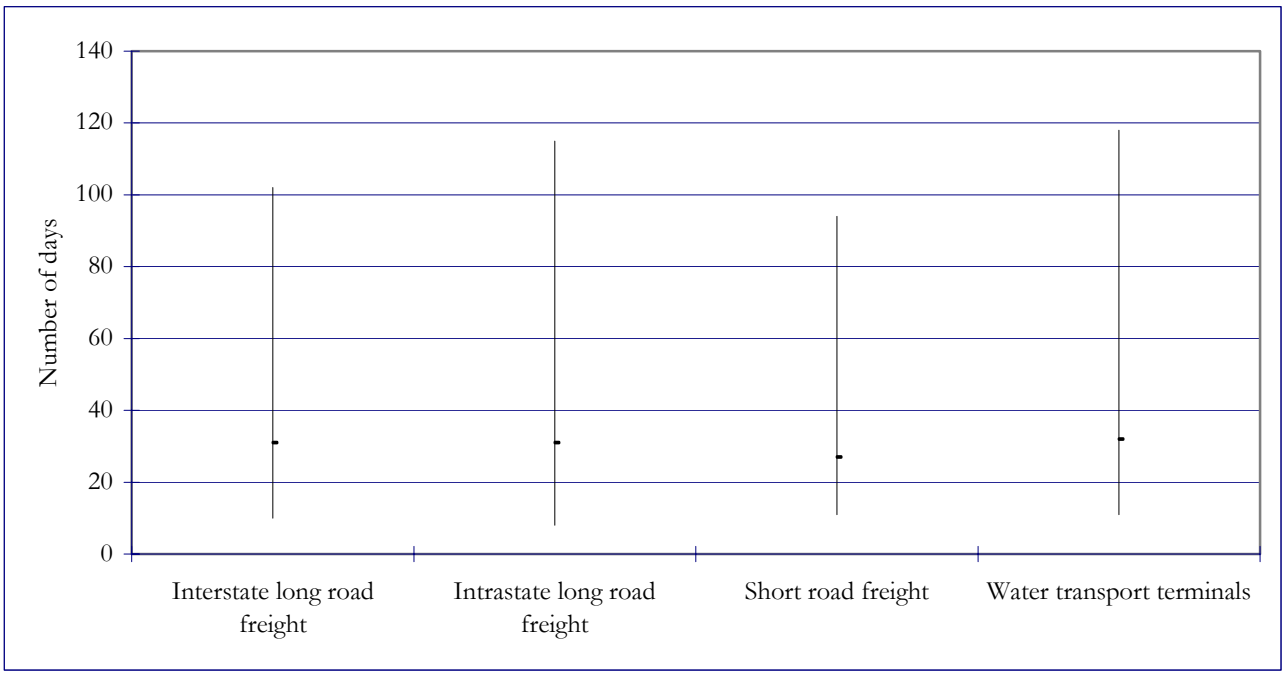
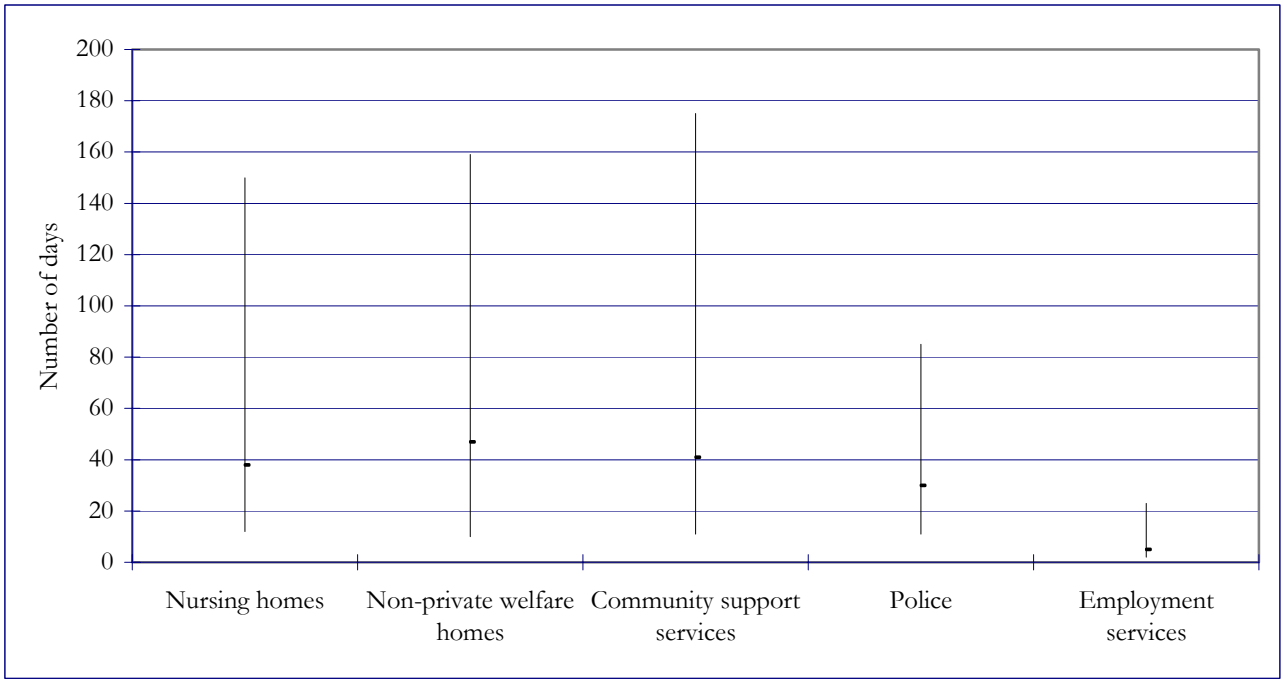


Figure 3.5 shows the variation within five sub-industries of Community services. The plots for Nursing homes, Non-private welfare homes and Community support are similar to previous results. Those results for Employment service and to a lesser extent, Police seem very low. Examination of the individual case results for revealed a very high number of weekly payments of just one and two days. We don't know the reason for these claims but suspect that they represent some particular circumstance that is atypical of other claims.

Figure 3.5 Variations in duration of claims in subindustries of Community services



Another way to explore the claims behaviour is to consider duration for particular conditions or for claims related to particular body locations. Strains and sprains of the back have developed a reputation for leading to particularly long claims. In Figure 3.6 we compare the means and quartile boundaries for these claims in four industries and for all industries.

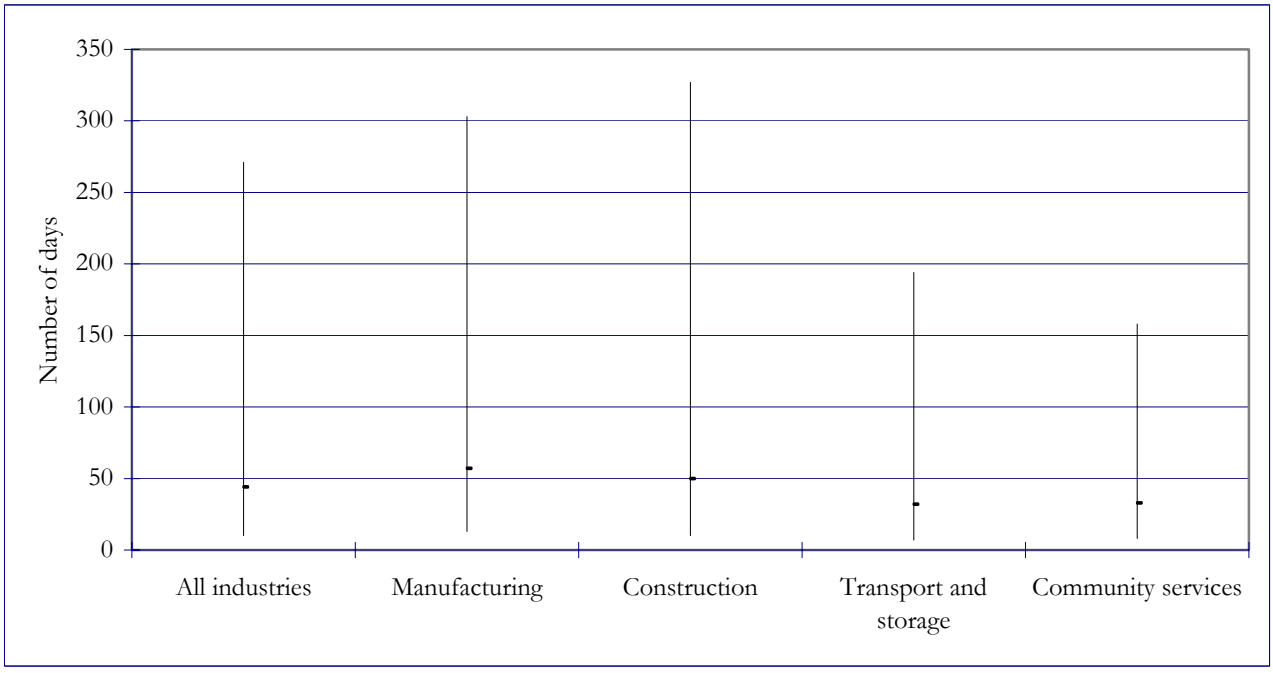


Figure 3.6 Variations in durations of claims for sprains and strains of the back among industries

Comparing Figure 3.6 and Figure 3.1 we can see that claims for strains and sprains of the back are considerably longer than other claims. Within industries claims are particularly long for Construction and Manufacturing.

4. The modelling framework

We separately model payments made as pensions (weekly payments) and payments made as lump sums to meet common law judgements, medical, legal and other purposes (non-weekly claims).

The weekly payments are modelled in two parts, first there is decision about whether or not a pension will be paid, and given that a pension is to be paid the duration of the pension. Non-weekly payments have no time dimension but again there is a two-part process. In the first part we aim to explain whether or not a claim will incur a particular non-weekly expense (incidence) and then we model the size of the payment. We consider separately medical payments, legal payments and common law payments.

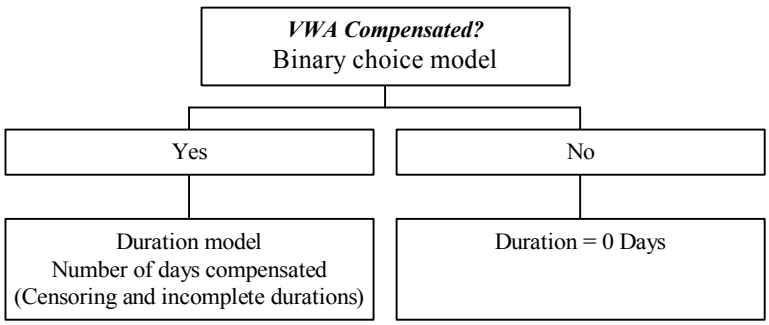
4.1 Weekly compensation

In Figure 4.1 we show the two parts of the weekly compensation model. The first part is a binary choice model of whether or not a weekly claim is likely to occur. Binary choice models are distinguished by having a dependent variable that can take the value of one (there will be a weekly payment) or zero (there will be no weekly payment).[9]

In the event that there is a weekly payment we then aim to estimate the likely duration of the weekly payments. This constitutes the second part of the model. The cost of the weekly payments is then a simple identity according to the rules and regulations of the WorkCover relating to the pre-injury earnings of the claimant. Note that in measuring the duration of the weekly payment we do not count the first ten days off work since under WorkCover regulations the employer meets these costs.

The modelling is not strictly a representation of the behaviour of either of the mai parties involved (ie the claimant and the insurer). The first step, to make or not make a claim, may be considered a choice of the claimant who, in most circumstances will start the process. However the second step in which the duration of the claim is determined, is the outcome of a process involving claimant, insurer and the environment concerning the claim. No party can be visualised as having behavioural control of this step. Consequently there is no identifiable underlying structure and it is not sensible to consider the two-step process as a reduced form of a structural model. Rather the estimated model is a process, the outcome of joint decisions of claimant and insurer and an environment largely beyond the control of either.

Figure 4.1 Weekly Compensation Model



Thus there is a binary choice model for the probability that a claim will receive payment from VWA for time off work (equivalently that a claim results in more than 10 days off work). If a claim is not VWA compensated then the expected claim duration will be zero days. However, if a claim is VWA compensated then we need to model the number of days compensated. For this modelling exercise we need to note the following characteristics:

- there is a substantial tail of long claim durations (so the data are heavily skewed);
- we recode any claim with days ≥ 520 to be 520 and take this to indicate 520+ days (the data are censored);
- some claims are still open at the end of the period –durations are incomplete (the data are censored); and

[9] There are two main binary choice models used, probit models and logistic (logit) models. In the work reported here we initially used probit models but after discussion with the VWA switched to logit. The general form of the logit model is: *probability(dependent variable = yes)* = $e^{\mathbf{X}\beta}/(1+e^{\mathbf{X}\beta})$, where **X** is a vector of explanatory variables and β is a vector of coefficients.

- we utilise an appropriate duration model that can be written as a regression model for the logarithm of duration time with non-normal errors.

Binary choice model for VWA compensated

In this component of the model we estimate a model for the probability that a claim is VWA compensated. We use a Binary choice model for the indicator variable (=1 if Days compensated >0, = 0 if Days compensated =0). We hypothesise that this probability may depend upon claimant characteristics, characteristics of the accident, industry, employer and agent characteristics. One variable that we do not use is the Severity code as it is a perfect predictor since "No code" implies Days compensated = *0*.

Duration model for days compensated

The modelling of the duration of the claim requires a duration or survival model. A duration model has the length of the time in a particular state as the dependent variable. Alternatively the problem may be cast as the time until failure or survival time (of a particular state such as that of receiving WorkCover weekly payments). Whatever the interpretation of the dependent variable this class of models is appropriate for estimating the factors influencing the length of time a particular claimant receives weekly payments.

We utilise a parametric duration model in which we assume a functional form but the estimation of the coefficients of the model or parameters, provides information about critical aspects of the modelling. By this method we are able to tackle two important issues, duration dependence and unobserved heterogeneity.

Duration dependence occurs when the length of a claim affects the probability that it will continue. We use an approach that allows us to test for the existence of duration dependence. Unobserved heterogeneity occurs because our data contain only a small part of the variables likely to affect the existence or continuation of a claim. Some of the most important factors will be features of individual claimants such as their level of general health, their determination and outlook, their alternative opportunities and their moral and social support. None of these are observable but may influence the speed of recovery (the dependent variable).[10]

Parametric duration models may be set up such that duration times depend upon a set of explanatory variables (or covariates). In the case of modelling the VWA claim duration times these are the claimant, employer and agent characteristics. These covariates are intended to incorporate observation specific effects. However, it is often the case that systematic differences in the distribution of duration times remain after the observed specific effects are accounted for. Thus the model is incomplete.

(Unobserved) population heterogeneity postulates that, over and above the variability accounted for by the claimant, employer and agent characteristics, expected claim duration times vary over the population according to some distribution. For instance a frequently advanced explanation for the extra variability is that available claimant variables do not include the important personal characteristics mentioned above. The presence of unobserved heterogeneity can have two impacts upon duration modelling. The parameter estimates will be inconsistent and/or inferences will be based upon inappropriate standard errors.

One solution to the situation of unobserved heterogeneity is to assume a parametric form for it and use distribution-mixing arguments. Heckman and Singer (1984) argue that this approach leads to over parametised models and serious errors in inference. Further, Gourieroux, Monfort and Trognon (1984) argue that the primary impact of unobserved heterogeneity is that inferences will be based upon inappropriate standard errors. On the basis of this evidence we choose to use a "robust" estimator of the standard errors in our Weibull model (see Gourieroux, Monfort and Trognon (1984) and White (1982)). This implies that inferences from our fitted duration model(s) will not suffer from biases in inference.

We hypothesise that claim duration may depend upon claimant characteristics, characteristics of the accident, industry, employer and agent characteristics. However, for this model we are able to use the severity variable as a potential explanatory factor.

When the two components of the weekly compensation model have been estimated we can estimate the expected weekly compensation amount ($) using:

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[10] We use a parametric specification in which, controlling for claimant, employer and agent characteristics, we can test for the type of duration dependence and control for unobserved heterogeneity (see Greene 2000, Kiefer 1988 for more details of parametric duration modelling). We ascertain whether claims exhibit positive or negative duration dependence. Positive (negative) duration dependence occurs when the probability that a claim will end increases (decreases) as the claim increases in length. We use the Weibull distribution with hazard function $\lambda(t)$ for the length of the claim given by: $\lambda(t) = \gamma\alpha t^{\alpha-1}, \quad \alpha, \gamma > 0$. This distribution exhibits positive duration dependence if $\alpha > 1$ and negative duration dependence if $\alpha < 1$. Estimation of the model allows us to test for the type of duration dependence.

Expected number of days X *Compensation rate* X *Pre injury earnings*

The first of these comes from our duration model, or is zero if a claim is not VWA compensated. The second and third terms are given by the VWA compensation rules and are related to injury severity. Note that if required, this can be weighted by multiplying by the probability that a claim will receive VWA weekly compensation.

4.2 Non-weekly compensation

As indicated in Table 3.1 Total non-weekly compensation is defined by:

Total non-weekly payments = Lump sums + Medical + Legal + Other

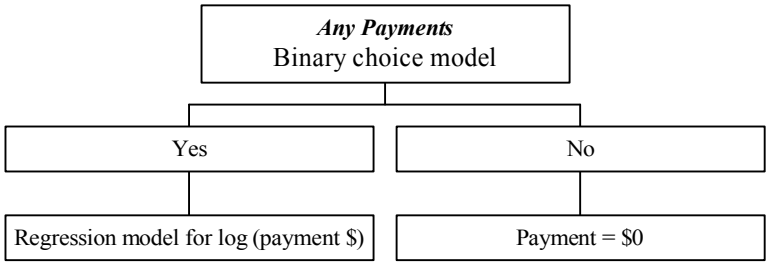
and *Lump Sums* are calculated from:

Lump sums = Maims + Common law + Death + Redemptions/ settlements

In our modelling we will focus on modelling only the three major payment types: *Common Law Payments, Medical Payments* and *Legal Payments*.

In these three cases we choose to use a two-part model described in Figure 4.2.

Figure 4.2 Non-weekly Compensation Model



Thus,

$$Payment = Incidence \times Amount,$$

with

$$Incidence = Probability(Amount > 0),$$

determined by a binary choice model. We hypothesise that this probability may depend upon claimant characteristics, characteristics of the accident, industry, employer and agent characteristics. In the second part of the model the *Amount* is determined by a regression of log(*Amount*) on upon claimant characteristics, characteristics of the accident, industry, employer and agent characteristics. Additionally, for this model we are able to use the severity variable as a potential explanatory factor.

An alternative specification to the two-step framework shown here might consist of a single equation left censored payments model in which zero payments correspond to zero incidence. However we prefer a two-step process because it gives us the opportunity to allow variables to independently influence incidence and payment amount.

A stylised fact concerning the application of regression models to cross section (individual unit record data) such as this is that it is highly probable that the random term will have a heteroscedastic formulation and we adopt a modelling strategy to account for this.[11]

4.3 Marginal effects in two part models

Although attractive in their simplicity the two part models described above do have their own peculiarities. In particular, we are seldom interested in log($) or log(Days). Thus we need to retransform to $ or Days. It is this retransformation that causes complications.

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[11] Tests on the regression results reported in the preliminary report confirmed that the only statistical problem was heteroscedasticity. Thus in our regression modelling we use the following multiplicative heteroscedastic regression model: $log(payment\,\$)_i = \mathbf{x}_i'\hat{a} + u_i$, where $u_i \sim N\left(0, \sigma_i^2\right)$, $\sigma_i^2 = exp(z_i'\alpha)$ and $i = 1,...,n$; that is a regression model where the error variance is postulated to depend upon a set of explanatory variables labelled z.

This issue has been discussed extensively in the health economics literature (see Duan (1983), Jones (1998), Manning (1998) and Mullahy (1998)). In this literature it is shown that the expected payment or expenditure is equal to the product of the probability of a payment occurring and the expected value of the payment given that it occurs. The problem occurs because the expected value of the payment is estimated in log form. In order to convert from logs to levels we need to assume that the expected value of the payment is log-normally distributed. [12]

Additionally, the results of Manning (1998) and Mullahy (1998) suggest that in our applications the covariates that impact upon log$ will also impact upon its variance[13]. Using the results above we can see that to assess the impact of changes in any of our covariates we will have three potential impacts to combine. These are the impact on the incidence probability, on the amount and on the variance of the amount. To assist in the calculation of these impacts (or marginal effects) we have created a spreadsheet[14]. Examples of calculated marginal effects are given in section 5.

4.4 Survivor curves

Of particular interest in duration modelling is the survivor function, which shows how the probability of claimants remaining so changes over time. [15] This function can be plotted against time. Additionally, we can compute the median claim duration from the survivor function. Examples of these curves can be found in section 5.

[12] That is if the expected value of the payment is given by:
$E(Expenditure\$) = P(Expenditure\$ > 0) \times E(Expenditure\$ \mid Expenditure\$ > 0)$ we assume, $E(Expenditure\$ \mid Expenditure\$ > 0) = exp(x_i'\beta + 0.5\sigma_i^2)$

[13] To avoid excessive parameterization in an already highly non-linear model in the Weibull duration models we assume a homoscedastic error formulation. We also use the conditional expectation result from the normality assumption as an approximation to the true scaling constant or a nonparametric "smearing" estimator (Duan (1983)). In the heteroscedastic function we assume: $z_i = x_i$.

[14] These spreadsheets (for males and females) are a secondary deliverable of the project.

[15] $S(t) = Pr(T \geq t)$. This gives us the probability that a claim will last at least *t* days. For the Weibull distribution this is given by: $S(t) = exp(-\gamma t^{\alpha})$

5. Results

5.1 Some general points

All incidence models are logistic binary choice models. Duration models are Weibull models. Payments models are heteroscedastic regression models for the log of the payment amount. Modelling concentrates on main effects (even then there are small cell, or sample sizes to estimate these on). We do not have enough observations to estimate interactions e.g. industry and timeliness with any degree of precision.

Modelling procedure follows a general to specific paradigm. That is all variables likely to influence the outcome in question were initially included and then insignificant variable(s) (or blocks of indicator variables for factors such as industry) were removed from the model. If a factor (e.g. bodily location) was found to be significant (the set of indicator variables associated with the factor are jointly significant) then all indicators remain in the model.

Overall goodness of fit is assessed using a chi-squared test (analogous to the overall F-test in a linear regression). For the logistic models a further indicator of the goodness of fit of the model is the hit and miss table. This shows the number of times the model correctly or incorrectly predicts the outcome for each observation. There are four possibilities, a correctly predicted 0 outcome, a correctly predicted 1 outcome or incorrectly predicted 0 and 1 outcomes. The percentage of correct 0 and 1 answers and the average correctly predicted is reported in the table.

5.2 Summary of results

The Appendix contains the full tables of results for all models. In this section we concentrate on the key findings.

- All models have good levels of overall fit and contain factors that are (jointly) significant.
- For the duration regressions the value of alpha shows whether duration dependence is negative or positive. For both males and females alpha was less than one indicating negative duration dependence. That is, the probability of the spell ending (returning to work) decreases with the length of time on benefit.
- The employer size variable is negative or insignificant in most regressions, as expected, indicating that large employers do better.
- Age is strongly positively correlated with incidence and duration of weekly payment
- The timeliness variables were helpful in explaining duration of weekly payments for both males and females- the longer the delays the greater the duration of payments
- The medical intervention variables were also helpful in explaining duration of weekly payments for both males and females.
- There was some variation in the relationship between insurers/agents and incidence, considerably more in regard to duration. This may be because some insurers have better performance or some insurers focus on more difficult cases.

We have estimated regression equations that aim to explain the incidence and duration of weekly payments and the incidence and amount of Common law payments, medical payments and legal payments. In all of these regressions we sample from the group of WorkCover claimants not the whole population so by virtue of being a claimant the issue is not whether there will or will not be payments but rather the form of those payments and their extent.

There are two main ideas that we explore in the discussion. The first concerns the identity of the variables that are associated with increases in incidence, duration or amount of payments. The second idea is that given a variable is significantly associated with one of our dependent variables (incidence, duration or amount), how important is it in affecting outcomes. Because of the two-part structure of modelling cannot we cannot simply read the coefficients of the variables to estimate the marginal effects.

For each of the payment types we discuss first the significance of variables and then their marginal effect on outcomes. In the final part of the section we use spreadsheets of marginal effects to calculate survivor functions under different scenarios.

5.3 Weekly payments

Significance of variables

Table 5.1 shows the explanatory variables we have used to explain the incidence and duration of weekly payments for males and females. For each explanatory variable we report a statistic that indicates the level of confidence in the estimated relationship with the dependent variable. The statistic is the t-statistic and the larger the number the more confident we can be that the variable in question is associated with the dependent variable.[16] A positive sign indicates that increases in the explanatory variable are associated with increases in the dependent variable while a negative sign indicates that increases in the explanatory variable are associated with decreases in the dependent variable.

Table 5.1 Weekly payments, significance of explanatory variables (t statistics)

	Females		Males	
Explanatory variable	Incidence	Duration	Incidence	Duration
Age at Accident	2.8	9.1	3.7	16.4
Employer Remuneration	-5.9	-1.6	-6.5	
Timeliness variables				
Injury to agent				7.2
Injury to employer		2.3		
Agent to first payment		5.5		6.5
Medical intervention variables				
Rehabilitation		45.2		66.9
Hospital		16.9		30
Agent/Insurer relative to Agent A				
Agent B		3.9		6.9
Agent C			-3.2	
Agent D			3.7	4.3
Agent E				2.3
Agent G				2.2
Agent H		2.3		-2.4
Agent J	4.2			
Agent K			-2.3	
Industry relative to Manufacturing				
Agriculture	3		9.3	
Mining		-3.6		
Electricity Gas & Water	-2.2		-10	-4.5
Construction			9.5	
Trade	-2.9	-4.8		
Transport & Storage		-2.4	5.2	-2.4
Communication	-2.2	6.7		-2.3
Finance, Property & Business Services	-2.3	-2.5	-2.8	
Public Administration		4	-4	
Community Services		-6.4		-6.8
Recreation Personal & Other Services		-2.3	-5	
Affliction relative to sprains and strains				
Deafness			-12.1	
Open Wounds	2.5	-8.7	6.6	-9.8
Fractures	9.3	-2.9	16.9	4.1
Contusions			4.2	-3.8
Dislocations			4.4	2.2
Internal Injuries	3.2		13	-5.7
Superficial Injuries			3.3	-9.8
Burns	2.6	-4.3	6	-4.7
Multiple Injuries	2.3	2.8		

[16] Generally a value of greater than 2 establishes a strong case that there is a relationship between the independent and dependant variables. Technically there is a less than one in twenty chance that this relationship could occur by chance. In Table 5.1 we report only t-statistics with values greater than 2.

Stress	13.7	4.4	16.1	9.5
Circulatory Disease			-4.4	5.2
Other	5.5		2.7	3.4
Bodily Location -relative to back				
Head	-13.9	-2.5	-18.8	-5.1
Neck	-7.6		-8.6	
Trunk	-3	-3.9	-2.9	-7.1
Upper Limbs	-4.8	-4.1	-6.1	-9.1
Lower Limbs	-3.1	-7.6		-11.1
Multiple Locations/Other	-4.5		-2.8	
Unknown/Not Coded	-5		-10.3	
Incident Type relative to overexertion				
Fall of Person			8.2	
Falling Object/Substance			2.9	
Caught	2.9		3.8	-2.3
Other Types n.e.c.	-3.2			
Vehicle Accident				3.5
Unknown	-2.4		-4.6	
Agency of Injury relative to other agency nec				
Machinery			2.2	
Powered Tools & Equipment	-2.4		2.3	
Unpowered Tools & Equipment				-2.3
Working Environment			-3.1	
Animal, Human & Biological	-3.8		2.5	
Not Identified			-3.3	
Severity relative to no current work capacity				
Serious Injury		13		23.2
Total & Permanent Injury		11.9		19.9
Duration dependence		negative		negative

For many of the variables, the significance of a particular value is relative to an omitted option. For instance in the first column of figures we see that having Agent J as an agent rather than Agent A is likely to lead to an increase in the probability that a particular claim will lead to weekly payments. Similarly, among the industry variables, the incidence of weekly payments for both males and females is increased when the claimant works in Agriculture rather than in Manufacturing.

In the case of the incidence regressions the dependent variable may be either one, weekly payments occur, or zero weekly payments do not occur. The explanatory variables increase or decrease the probability of payment occurring or not occurring. In the duration modelling we estimate the effect the explanatory variables have on the length of the payments, given that they will occur.

For the duration regressions we report whether or not there is duration dependence.

Some preliminary observations on the results

The employer size variable is negative and significant for both incidence and duration among females and for incidence among male claimants. This supports results from previous research. It suggests that larger employers are likely to incur lower WorkCover costs per employee.

Age is strongly positively correlated with incidence and duration of weekly payments for both males and females.

The timeliness variables were helpful in explaining duration of weekly payments for both males and females- the longer the delays the greater the duration of payments.

The medical intervention variables were also helpful in explaining duration of weekly[17] payments for both males and females. Being hospitalised or undergoing rehabilitation is very strongly related to increased duration of benefits.

[17] Note, the category 'rehabilitation' includes payments made to 'occupational rehabilitation providers', 'personal and household' services and vocational rehabilitation payments.

There was a wide range of contextual variables that helped explain both incidence and duration of male and female weekly payments. These included the identity of the agent, the industry in which the claimant worked, the nature of the affliction, its bodily location, the nature of the incident that led to the condition or injury, the agency of the injury and, for duration, the severity of the condition.

There was negative duration dependence for both males and females.

Marginal effects

While Table 5.1 is useful in exploring the determinants of the incidence and duration of weekly claims, it does not allow us to predict the effect of a change in a variable on the incidence or duration of payments. Because we have a two-part model the coefficients on either incidence or duration will not alone, tell the marginal effect of a change. We need to construct a tool to show the effect of a change on incidence then, given the probability of incidence on duration. We have built such a tool and use this to undertake marginal analysis. In Table 5.2 we report the results of this analysis.

The marginal analysis shows the effect of a change from a particular base situation, the base case. The base case is the situation corresponding to one in which continuous variables are at their means and particular values are chosen for dichotomous variables. In the following the base case for males is a person aged 40 at the time of the accident, working full-time, earning $470 per week, in an employer of size $4.7 million. For this base situation it takes 53 days between injury and agent receipt of claim, and 77 days between agent receipt of claim and first payment. There is no medical intervention, the agent is Agent A, and the claimant works in manufacturing industry. The claimant incurs a strain and sprain of the back as a result of overexertion.

Table 5.2 Marginal impact of a change of industry on weekly payments

	Incidence Impact	Duration Impact	Overall Impact
Expected Values			
Probability of VWA Compensation	0.7065		
Expected days compensated given days comp >0		136.70	
Expected days compensated			96.58
Change from Base			
Probability of VWA Compensation	0.1851		
Expected days compensated given days comp >0		2.38	
Expected days compensated			26.55
% Change from Base			
Probability of VWA Compensation	35.512		
Expected days compensated given days comp >0		1.776	
Expected days compensated			37.918

In Tables 5.2 we measure the marginal effect of a change from the base case to one in which the worker is employed in Agriculture. In other words we ask the question, what would be the effect on the incidence of weekly payments had the person been employed in Agriculture. The marginal analysis reveals that, the probability of an injured worker receiving weekly compensation would be increased by 0.1851 or 36 per cent had he or she been employed in Agriculture rather than in Manufacturing. The duration of the claim would be increased by a further 2.38 days or 1.8 percent so the overall duration (and therefore cost) of the claim would be likely to increase by 38 percent.

In Tables 5.3a and 5.3b we report the effect on the incidence and duration of claims for a number of other scenarios in which we change the base case situation to some other situation. The three columns in the table show respectively the effect of the change on the probable incidence, the duration of weekly payments and the overall impact. All changes are expressed as percentages of the base case situation.

Table 5.3a Effects of changes in variables on incidence and duration, females, per cent

	Incidence impact	Duration impact	Overall impact
Change of industry, Manufacturing to Agriculture	20.2	12.6	35.4
Change of industry, Manufacturing to Community services	-1.9	-32.4	-33.7
Change of agent from Agent A to Agent B	2.1	33.5	36.4
Increase in claimant age (from 40 to 50)	2.3	17.6	20.2
Increase in employer size (from wage bill of $4.7m to $144m)	-1.8	-1.4	-3.2
Reduction in employer size (from wage bill of $4.7m to $0.1m)	0.1	0.0	0.1
Change from no current work capacity to serious injury	0.0	1073.8	1073.8
Reduction to statutory limit, injury to employer	0.0	-1.8	-1.8
Reduction to statutory limit, employer to agent	0.0	-0.04	-0.04
Reduction to 28 days, agent to first payment	0.0	-4.9	-4.9
All time lag reductions, injury to first payment	0.0	-6.7	-6.7

Table 5.3b Effects of changes in variables on incidence and duration, males, per cent

	Incidence impact	Duration impact	Overall impact
Change of industry, Manufacturing to Agriculture	35.5	1.8	37.9
Change of industry, Manufacturing to Community services	1.4	-23.2	-22.1
Change of agent from A to B	-3.5	32.4	27.8
Increase in claimant age (from 40 to 50)	1.8	18.0	20.2
Increase in employer size (from wage bill of $4.7m to $70m)	-1.2	0.0	-1.2
Reduction in employer size (from wage bill of $4.7m to $0.1m)	0.1	0.0	0.1
Change from no current work capacity to serious injury	0.5	1795.9	935.8
Reduction to statutory limit, injury to agent	0.0	-3.3	-3.3
Reduction to 28 days, agent to first payment	0.0	-3.3	-3.3
All time lag reductions, injury to first payment	0.0	-6.5	-6.5

While shifting to Agriculture is associated with an increase in both the incidence and duration of weekly claims for both males and females, shifting to Community services is associated with falls in incidence and duration for females and a very small increase in incidence for males but a large fall in duration.[18]

Changing agent, from the base case Agent A to Agent B, results in increased likelihood of incidence and duration for females and a small reduction in incidence for males but a large increase in duration. An increase in the claimant age results in an increase in the incidence and duration of weekly payments for females and males.

Increasing the size of the employer (from $4.7m to $144m) was associated with a small reduction in claims incidence and duration among females. Increasing the size of the employer (from $4.7m to $70m) was associated with a small reduction in claims incidence among males. Reducing the size of the employer (from $4.7m to $0.1m) was associated with no change in incidence or duration among both males and females.

By far the biggest increase in duration was brought about by changing the classification of the severity of the injury. When the category was changed from no current work capacity to serious injury there was a dramatic increase in duration for both males and females leading to very large increases in cost.

The importance of timeliness is illustrated in the effect of reductions to the statutory limits of the times between injury and employer notification, between employer notification and agent acceptance of the claim and finally the time lag between agent acceptance and first payment received by the claimant. The effect of reductions to the statutory limits led to falls in duration of about 6.5 per cent for both females and males.

[18] Note that in measuring the effect of a change from the base case we are controlling for all other explanatory variables. Consequently some of the results may be different from those reported in the descriptive tables (3.3 to 3.6) which may reflect the effect of changes in a number of explanatory variables.

In general the marginal analysis confirm the work from overseas reported in section 1, and the prior beliefs of WorkCover personnel familiar with the data.

5.4 Non-weekly payments

Significance of variables

Table 5.4 reports the variables that are significant in explaining the incidence and amount of common law payments for males and females.

Table 5.4 Common law payments, significance of explanatory variables (t statistics)

Explanatory Variable	Females		Males	
	Incidence	Amount	Incidence	Amount
Weekly Pay at Accident		4.5	-3.5	5.9
Age at Accident	3.6	-6.8		-11.3
Employer Remuneration	-3.8			
Industry, relative to Manufacturing				
Agriculture			-2.8	
Construction			-5.2	
Trade			-3.6	
Transport & Storage			-2.9	
Community Services			-7.6	
Recreation Personal & Other Services			-3.9	
Affliction, relative to Sprains & Strains				
Deafness			-3.2	
Internal Injuries			-3.9	
Circulatory Disease			-3.2	
Bodily location, relative to Back				
Head			-2.3	-3.7
Upper Limbs			-7.1	-2.8
Lower Limbs			-7.1	
Incident type, relative to Overexertion				
Caught			2.1	
Vehicle Accident			-4.2	
Severity, relative to Current Work Capacity				
No Current Work Capacity				4.2
Partial Temporary Injury			14.1	3.4
Serious Injury			33.2	5.8
Total Temporary Injury			7.8	3.1
Total & Permanent Injury			27.5	4.8
Bodily Location, relative to back				
Head	-5.8			
Neck	-3.2			
Upper Limbs	-4.3			
Lower Limbs	-4.3			
Unknown/Not Coded	-2.3			
Severity relative to current work capacity				
No Current Work Capacity		-5		
Partial Temporary Injury	8.3	-4.9		
Serious Injury	20.4	-6.1		
Total Temporary Injury	5.7	-4.1		
Total & Permanent Injury	16.2	6.4		

Table 5.5 reports those significant in explaining incidence and amount of legal payments.

Table 5.5 Legal payments, significance of explanatory variables (t statistics)

	Females		Males	
Variable	Incidence	Duration	Amount	Incidence
Weekly Pay at Accident	-2.9		-6.2	
Age at Accident	6.6		7.6	
Employer Remuneration	-3.1			
Agent/ insurer, relative to Agent A				
Agent C			-4.1	
Agent J			-2.4	
Industry, Relative to Manufacturing				
Agriculture	-3		-3.5	
Electricity Gas & Water				-3.3
Construction			-5.1	-2.7
Trade	-4.8		-5.9	
Transport & Storage	-3.4		-4.2	
Finance, Property & Business Services	-3.4			
Public Administration	-5.1		-3	
Community Services	-10		-10.4	-3.4
Recreation Personal & Other Services	-5.3		-4.8	-4.4
Affliction, relative to Sprains and Strains				
Deafness			4.4	-5
Open Wounds			-2.6	
Internal Injuries			-5.9	
Superficial Injuries			-4.5	
Multiple Injuries			3	
Stress			5.5	2.2
Circulatory Disease			6.2	3
Other			3	
Agency of Injury, relative to other agency nec				
Powered Tools & Equipment	-2.4			
Unpowered Tools & Equipment	-2.2			
Materials & Substances	2.5			
Bodily location, relative to back				
Head			-5.2	
Trunk			-5.4	
Upper Limbs			-7.6	-5.6
Lower Limbs			-10.5	-3.9
Incident type, relative to overexertion				
Caught			2.7	
Contact with Electricity				2.9
Explosion/Implosion			3.7	
Other Types n.e.c.			3.8	
Vehicle Accident				-3.1
Severity, relative to current work capacity				
No Current Work Capacity			4.7	
Partial Temporary Injury	16.7	4.8	22.1	4.8
Serious Injury	24.5	12.7	36.6	16.6
Total Temporary Injury	11.5	8.2	10.2	6.3
Total & Permanent Injury	23	7.8	33.1	10.4
Sample size		1401		

Table 5.6 reports the variables that are in significant relationship with the incidence and amount of medical payments.

Table 5.6 Medical payments, significance of explanatory variables (t statistics)

	Female		Male	
Variable	Incidence	Amount	Incidence	Amount
Weekly Pay at Accident ($000)	7	4.9	10.5	16.5
Age at Accident ((Years-40)/100)				15.7
Agent/ insurer, relative to Agent A				
Agent C			-2.4	
Agent D				2.3
Agent E				2.6
Agent F				4
Agent H			-4	5.8
Agent I			2	
Agent K				2.4
Industry, relative to Manufacturing				
Agriculture		-3.3		-3.7
Electricity Gas & Water				-4.4
Construction			3.5	-3.7
Trade			5.4	
Transport & Storage			2.5	-4.8
Public Administration		-2.4		-3.5
Community Services		-6.5	5.3	-15.3
Recreation Personal & Other Services			7.5	-5.3
Affliction, relative to sprains and strains				
Deafness	-9.3	-4.2	-21.2	5
Open Wounds		-2.3	6.2	-1.6
Fractures		2.6		7.2
Contusions		-2.3		-4.5
Musculo-Skeletal Diseases			-2.1	2.5
Dislocations				3.6
Internal Injuries		5.2	11.3	11.6
Superficial Injuries		-2.2	4.9	11.8
Burns	2	-4.7		-3.3
Multiple Injuries		2.2		2.4
Stress	-8.3		-15.3	
Circulatory Disease	-3.1		-10.4	
Skin Diseases	-3.9	-3.8	-4.2	-2.8
Other	-2.2		-7	
Bodily location, relative to back				
Head			4.6	
Neck			3.5	
Trunk	-3.6	-4.3	-4	
Upper Limbs			6	
Lower Limbs			3.1	8.7
Multiple Locations/Other				2.8
Unknown/Not Coded	-3.6			
Incident type, relative to overexertion				
Fall of Person	4.8		3.6	2.2
Falling Object/Substance	2.4			-2.1
Stepping on/Struck by Object	3.9		2.8	
Caught			2.4	4.8
Exposure to Extreme Temperature	-2.5		-3	
Contact with Electricity	2.2		2.7	2.7
Explosion/Implosion				2.2
Repetition Injury			-2	
Other Types n.e.c.	-3.9		-7.6	
Vehicle Accident	2.2		2	5.5
Unknown	-2.3		-7.7	-4

Agency of injury, relative to other agency nec				
Machinery				2.4
Mobile Plant & Transport				3.4
Chemicals			2.3	
Materials & Substances			2.7	-4
Animal, Human & Biological			-3.1	
Severity, relative to current work capacity				
No Current Work Capacity				21.1
Partial Temporary Injury	13.2	27.8		38.8
Serious Injury	5.8	44.6		74
Total Temporary Injury		5.7		20.7
Total & Permanent Injury	2.6	41.7		64

Marginal effects

In Table 5.7 we show the marginal effect on medical payments for a male base case claimant.

Table 5.7 Marginal impact of a change of industry on medical payments

	Incidence Impact	Payments Impact	Overall Impact
Expected Values			
Probability of VWA Compensation	0.7867		
Expected compensation given compensation >0		1770	
Expected compensation			1392
Change from Base			
Probability of VWA Compensation	-0.0031		
Expected compensation given compensation >0		-236.4	
Expected compensation			-181.2
% Change from Base			
Probability of VWA Compensation	-0.393		
Expected compensation given compensation >0		-15.4	
Expected compensation			-15.0

Table 5.7 reveals that had an injured male worker been employed in Agriculture rather than in Manufacturing, the probability of him receiving medical payments would fall by 0.0031 points or by 0.4 per cent. However the likely cost of the claim would increase by $236 or 15.4 percent. The overall cost of the claim would increase by 15.0 percent.

We summarise a number of other marginal impacts in Table 5.8. We have also produced scenario's concerning common law and legal payments however the cell sizes of the observations used to generate these scenario's were small and the estimates are not considered as robust as those presented here for medical payments and previously for weekly payments.[19]

[19] The nature of payments included under Common law claims has changed over time making the data for Common law claims problematic: under earlier legislation Common law claims did not compensate for economic loss whereas more claims under more recent legislation does include economic loss. In addition common law settlements frequently followed periods of weekly payments and it is not clear to what extent claims included the earlier payments.

Table 5.8 Effects of changes in variables on incidence and amount for Medical payments, per cent

	Incidence impact	Duration impact	Overall impact
Females			
Change of industry, Manufacturing to Agriculture	0.0	-21.8	-21.8
Change of industry, Manufacturing to Community services	0.0	-19.8	-19.8
Change in severity from current work capacity to serious injury	23.3	1123	1408
Males			
Change of industry, Manufacturing to Agriculture	-0.4	15.4	14.9
Change of industry, Manufacturing to Community services	5.1	-24.7	-20.9
Change in agent from Agent A to Agent B	-1.8	12.6	10.6
Change in severity from current work capacity to serious injury	26.2	2208	2814

The scenarios chosen illustrate the effect of a variety of changes in Medical, common law and legal payments. In some of the cells there is no effect of a change. The effect of changes of industry have already been discussed. The change of agent from Agent A to Agent B for males follows a similar pattern to that of weekly payments with a small fall in incidence more than made up by a large increase in the likely size of the payout. The final example is the change in the severity of the condition. Not surprisingly a change from the base case, current work capacity to serious injury results in a dramatic increase in the likely medical payout for both males and females.

5.5 Survivor functions

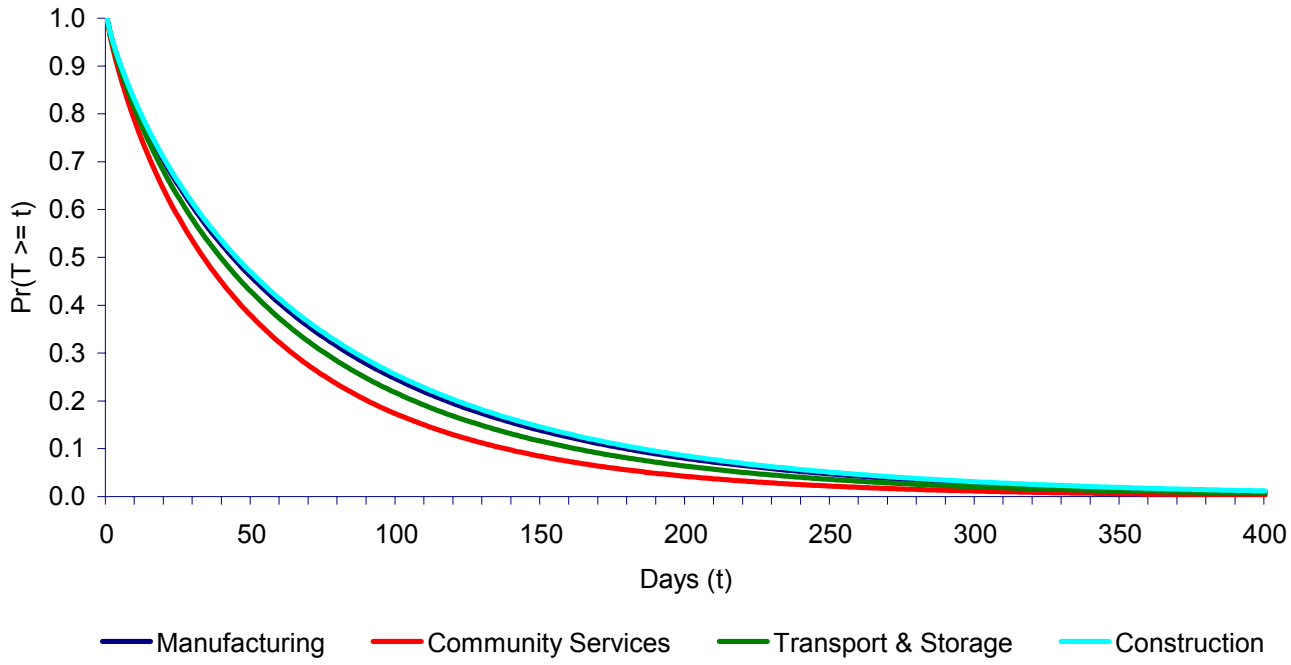
The models of incidence and duration for weekly payments can be used to compare the probabilities of claimants remaining on weekly payments over time. These comparisons, known as survivor functions, are a useful pedagogic tool.[20] In Figures 5.1 to 5.5 we compare the probabilities of survival of male claimants under a range of circumstances. The circumstances are, a change of industry, a change in the level of medical intervention, a change in the time lags between key processes in the performance of the claim, a change in the identity of the agent, a change in the severity of the injury, a change in the size of employer and a change in the age of the claimant. We have calculated survivor functions for both males and females but all but the last two survivor functions are for males. We cannot compare survivor functions for changes in employer size or age because neither of these two variables was important in effecting duration of claims for males (though they do effect incidence).

In Figure 5.1 we compare claimants working in four different industries, which are otherwise the same. That is we compare individuals who have common base case features but who vary only in the industry in which they work.

Figure 5.1 shows the probability of remaining on WorkCover benefit falls fastest for a worker from Community services and least for workers from Construction and Manufacturing with Transport and Storage in the middle. However the differences in the probabilities are not great. For instance we can read from the plot that after (being on benefit for) 100 days the probability of remaining on benefit is about 0.2 for Community service workers but nearer to 0.3 for Manufacturing and Construction workers. Another way to make the comparison is to compare the number of days at which the probability of remaining on benefit falls to fifty percent. For community service workers this appears to be at around 42 days whereas for Construction and Manufacturing workers it is over 50 days.

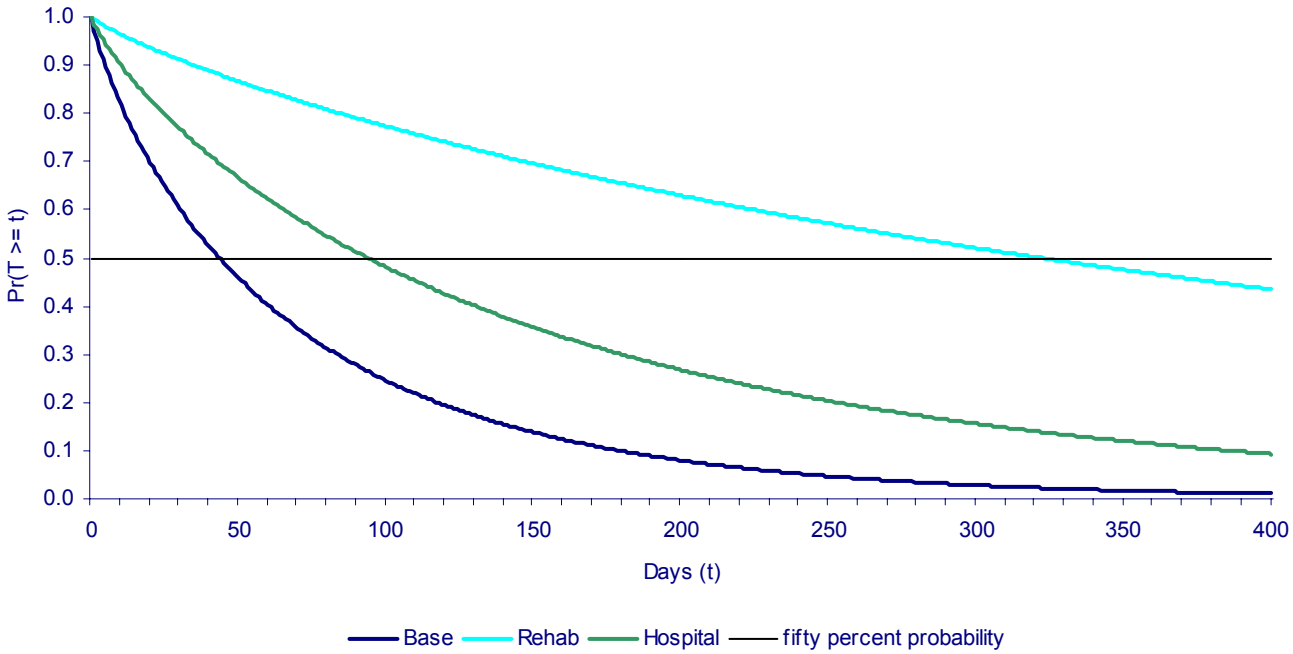
[20] The equation for the survivor function S(t) can be derived from the regression equations estimated in our modelling and reported in earlier sections. Specifically we derive;
$S(t) = \exp(-\exp(-\mathbf{X}'\beta.t)^{(1/\sigma)})$, where $\mathbf{X}$ are the explanatory variables, β their estimated coefficients and σ is a parameter.

Figure 5.1 Survivor Functions: Males, Industries



We can see greater differences if we compare the survivor functions for injured (base case) workers who are have rehabilitation or hospitalisation compared to those who don't. This is shown in Figure 5.2 for males.

Figure 5.2 Survivor Functions: Males, Medical Interventions

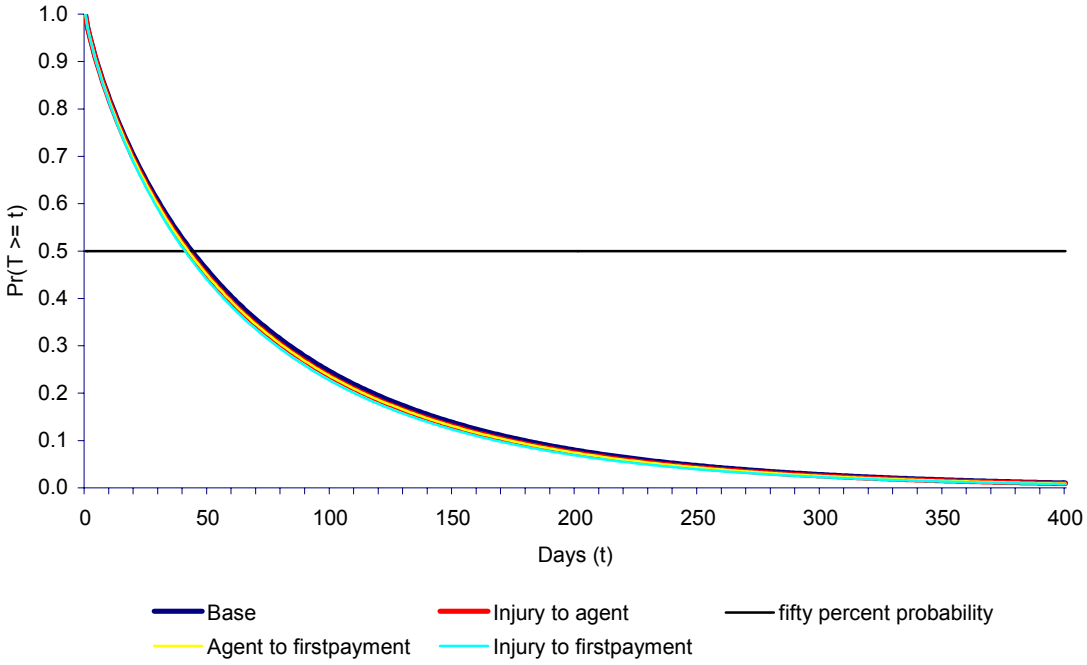


The differences are now very great. A worker with the characteristics of our base case claimant can expect to face a probability of remaining on benefit of a half after about 50 days. If the claimant undergoes

hospitalisation but is otherwise similar (that is similar according to the base case characteristics) the time taken for the probability to fall to fifty percent is about 100 days and where rehabilitation is involved the time to fall to a probability of fifty percent stretches to close to a year.

In table 5.3 we showed that reducing the time taken in the sequence of events from the occurrence of an injury and the receipt of a first weekly payment to statutory limits was associated with an overall fall in the impact on the cost of weekly payments of 6.5 percent.

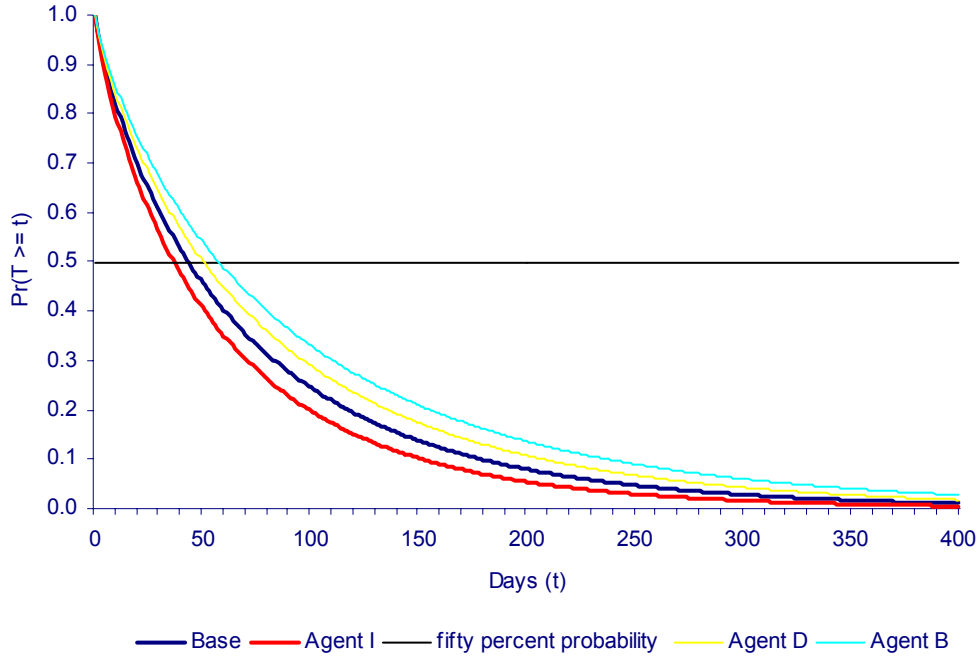
Figure 5.3 Survivor Functions: Males, Timeliness



The overall 6.5 percent reduction from the base when lags are reduced is hard to see on the figure, and the distinction between the component falls, from injury to employer receipt, from employer to agent acceptance and from agent to first payment, are impossible to see. However the results are also shown in tabular form in Table 5.3. A similar plot for females revealed the same results.

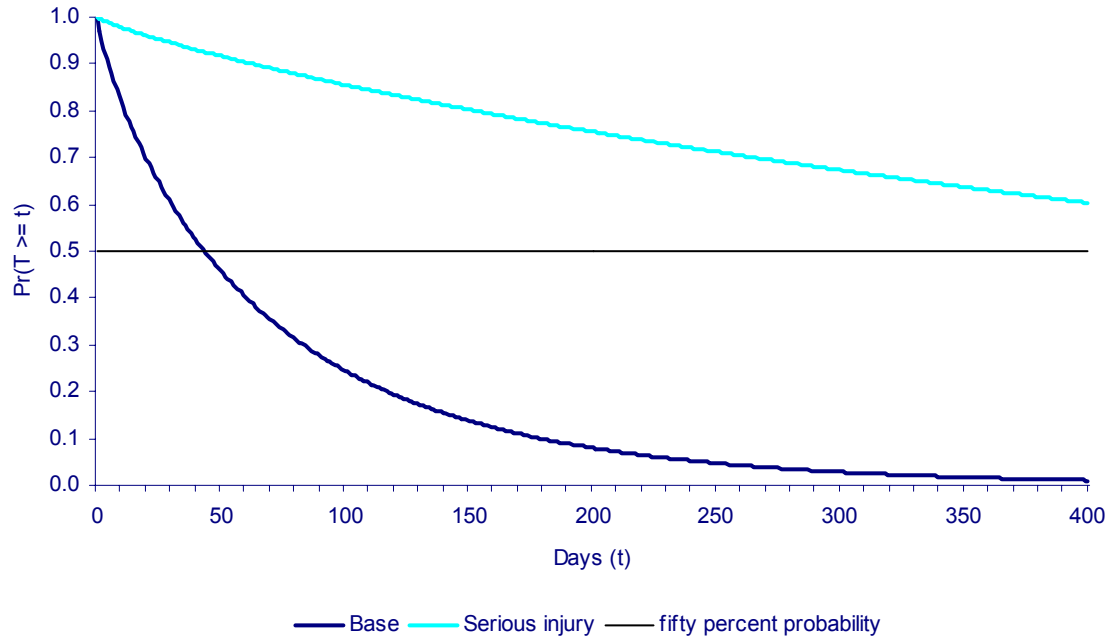
In Figure 5.4 we show the survivor curves for a change in agent from the base situation of Agent A, to Agent I, to Agent D and to Agent B. The survivor functions indicate that average duration of claims falls moving to Agent I but rises going to Agent B. The plot for Agent D is almost identical to that for Agent A (the base situation).

Figure 5.4 Survivor Functions: Males, Agents



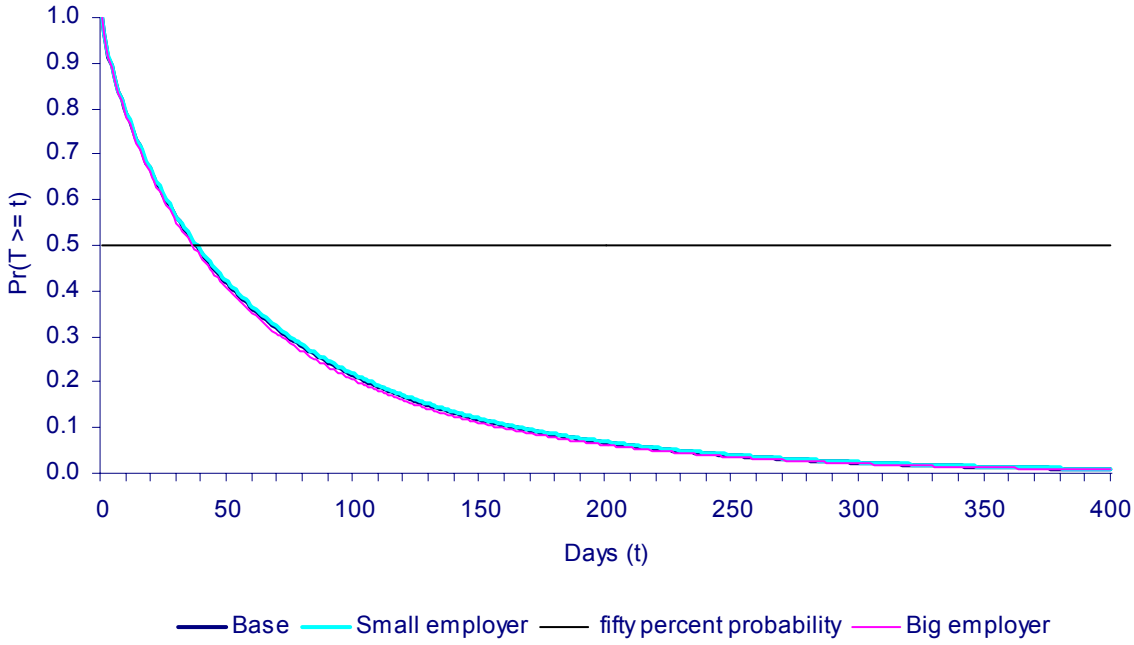
In Figure 5.5 we report survivor functions for a change in the severity of the injury or condition for males.

Figure 5.5 Survivor Functions: Males, Severity of Condition



The figure shows that the severity of the condition is a very strong indicator of the likely length of claim. After 400 days there is a sixty percent probability that claimants whose condition is severe (rather than the base classification of no current work capacity) will remain on payment.

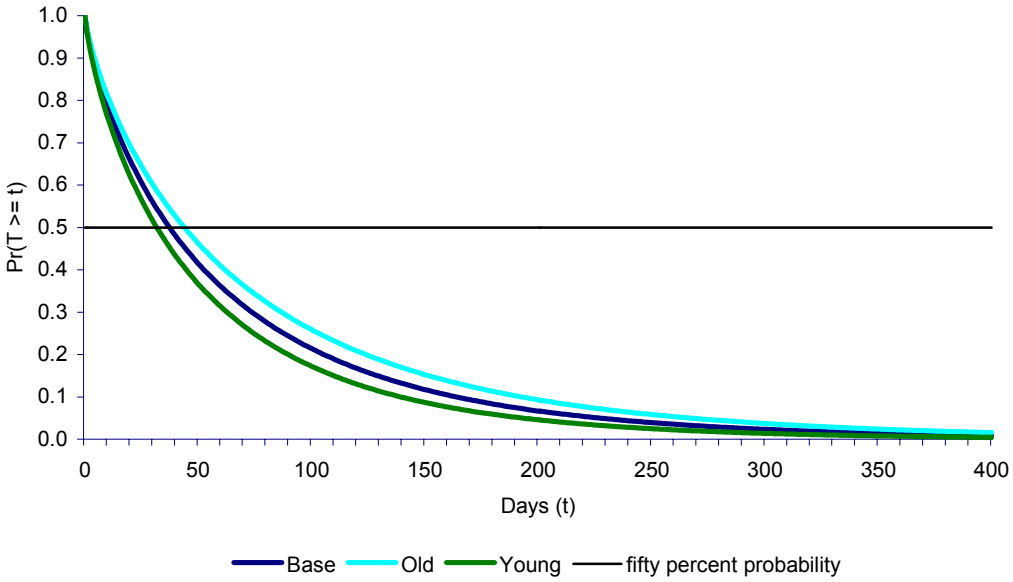
Figure 5.6 Survivor Functions: Females, Employer Size



In Figure 5.6 we show the comparison of the influence of size of employer, measured by the total wage bill (or remuneration) on the survivor function. We compare the base situation for females in which the firm size is $144 mill to a small firm of about a tenth this size ($15 mill wage bill) and a very large firm with remuneration of $500 million. While the regression equation indicates that employer size is significant it is hard to see much effect in Figure 5.6. Table 5.3 reveals that small employers are likely to be associated with an increase of about 1.7 percent in the duration of claims over the base case. However as we have noted the most relevant comparison may not be between a firm of size $144mill and a firm of size $15mill but rather between one of size $15mill and one of size $1.5mill.

Figure 5.7 compares the survivor functions for females aged 30, 40 (the base case) and 50. The 17 percent increase in the expected duration of claims for older female claimants reported in Table 5.3 can be clearly seen in the figure.

Figure 5.7 Survivor Functions: Females, Age



6. Concluding comments and further work

6.1 Summary of findings

The literature reported in section 1 indicates a large and growing research agenda in the US exploring factors related to claims. Most of the research reported emanates from purpose-designed projects to investigate particular aspects and some of the most convincing work is expensive involving matched trials. The research suggests that claims behaviour is effected by employers, agents and the nature of medical provision.

The WorkCover claimant administrative data set provides a rich and extensive source of information for studying factors associated with workers compensation claim behaviour. However unavailability of some key variables may compromise multivariate analysis using this dataset. The return to work surveys provides information on employment conditions upon return to work that may usefully complement the claimant data if the survey responses can be matched.

This report has had the primary aim of shedding light on factors effecting the return to work of claimants. This has been interpreted as the development of models to explain incidence, duration (in the case of weekly payments) and amounts of compensation paid in various forms.

The results suggest that robust models of claim behaviour may be modelled using the administrative data set. The models capture many of the desirable features suggested by previous research and from institutional knowledge of claim behaviour. In particular we have been able to demonstrate a role for employers, agents and providers in influencing outcomes.

However some limitations of the research method have also been noted. We have pointed out that we do not have a direct observation of return to work and while cessation of weekly payments is synonymous with return to work in most cases there will be important situations where this is not true.

Our models explain the incidence, duration and amount of claims. They are useful for planning purposes (and indeed the SCE has been used in this way for a number of years) but to make a contribution to policy the links with behaviour need to be drawn out. In particular we would like to know why particular variables influence incidence, duration and amount of claims. Answers to the why questions provide insights into behaviour. While a contribution of the project has been the verification that employer, agent and provider variables are important in influencing claims the size of the effect appears small. However this may be a consequence of poorly defined variables rather than that these influences actually are small. We have noted that most overseas studies investigating these issues used variables much closer in nature to the underlying concepts than we have been able to achieve here. The issue needs further investigation.

We suggest that remedies for these limitations lie in more detailed purpose designed research.

6.2 Future research

A key aim for future research is to augment the administrative database. There are several possibilities:

- Use of return to work data;
- Other surveys of claimants; and
- Surveys of workplaces, agents and providers

Use of the Return to work survey

Information from the return to work survey may be useful in augmenting the existing database. This is a low cost option of obtaining more information because the individual responses can be matched to the administrative database. However confidentiality and privacy concerns in relation to the return to work data require that matching be done at arms lengths from the VWA.

There are a number of questions in the return to work survey that might provide responses that could shed light on issues concerning return to work. Questions include:

> What is the main reason you returned to work?

This is open ended but may be coded into responses such as:

- 'recovered from injury';
- 'offered alternative duties';
- 'wanted to keep job';
- 'bored at home';
- 'I was told to return by doctor' and 'doctors advice';

- 'pressured by employer'; and
- 'economic need' or 'needed the money'.

There are a number of questions that seem to explore the situation upon returning to work, for instance:

> When you first returned to work after your injury, were you given suitable duties at work?
>
> What was different about your duties when you returned to work compared to what you were doing when you were injured?
>
> Still thinking about when you first returned to work, were you receiving any weekly payments from WorkCover in addition to your wages?
>
> Still thinking about when you first returned to work, did you return to your previous hours?

Finally there are questions that directly seek respondents' attitude to going back to work:

> Did you feel ready to return to work?

The set of questions may be used to design indexes of employer responsiveness to the particular needs of recovered claimants returning to work.

Other surveys of potential claimants

The status of the return to work survey is not clear. While obtaining the data and matching it to existing records may be unproblematic there is also the possibility that privacy or confidentiality provisions prevent matching. Without matching there may yet be useful information from the return to work survey. Even so independent gathering of information from a population may also be of interest. One matter not tackled in the return to work survey is that, as with the client database, the respondents are limited to those who have already been claimants. However as has been pointed out in section 1 there may be broader issues that require a survey instrument applied to the entire workforce population rather than just those who are, or have been, claimants.

Other surveys of workplaces, agents or providers

Many of the overseas studies reported in the literature review in section 1 involved purpose designed collections of primary information from workplaces, agents or providers. In a purpose-designed collection the researcher has the opportunity to custom-design the variables to be used in the analysis and can therefore gain a very strong fit between the theoretical concept and the data. The major disadvantage of purpose designed information collection is the cost both in dollars and in time. Surveys are expensive and time consuming and as with all research, results are not guaranteed.

Other ideas that may be explored

There are several other issues that are relevant in relation to return-to-work studies. These include studies of employer management, agent incentive and the nature of provider arrangements.

Employer disability management : Among the most costly claims are repeat claims. Repeat claims may be related to the nature of individuals but overseas studies suggest that employer management is also a factor. Firms with good disability management practices have less repeat claims and the claims they have will be less costly. The existing client database may need to be developed to enable customers records to be constructed over more than one claim.

Agent incentive: The design of the rating system is an issue - with industry risk rating there is an incentive for agents to freeload or not to minimise costs.

Nature of medical provision: In the US where different types of medical provision may occur for workers compensation, some methods appear to be cheaper than others.

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Appendix I: Legislative changes, 1992-3 to 1998-9

There have been significant changes to workers compensation arrangements over the past 15 years. The changes concern both individual claimants and employer contributors. The main changes in relation to claimants are changes to scope for common law claims, changes to the level of claims at various times during the development of an injury, changes in the scope of liability; and changes to employment prospects during recovery. The changes in relation to employers include changes to average levy rates and premiums; introduction of penalties and bonuses and requirements in relation to employment during recovery.

Some of the most significant changes include:

1992/93

Accident Compensation Act amended and WorkCover created (December 1992)

Weekly benefits for first 26 weeks of incapacity increased to 95% of pre-injury ordinary time weekly earnings.

Weekly benefits reduced after 26 weeks of incapacity to 90%, 70% or 60% of pre-injury earnings depending on level of incapacity

Weekly benefits continue for totally and permanently incapacitated or seriously injured but cease after 2 years if workers have capacity to work.

Liability for journey to and from work transferred to TAC.

Common law restricted to workers with serious injuries (greater than 30% impairment) and capped to a maximum amount with an additional allowance provided for pecuniary loss.

Claims require employment to be a significant contributing factor to the injury.

Employers required to offer suitable employment within 12 months of injury.

Average levy rate remains at 3%.

Return to work multi-media advertising campaigns begin in April 1993.

1993/94

Employers excess increased to 10 days (July).

Rehabilitation based in workplaces (October).

Credibility adjusted experience rated premium system introduced.

Average premium rate reduced to 1.8 %, plus a surcharge of 25%, totalling 2.25%.

Date to lodge common law claims injured before 1 December 1992 extended to 29 June 1994.

Return to work multi-media advertising campaigns continue.

1994/95

Average premium rate maintained at 1.8%, plus a surcharge of 25%, totalling 2.25%.

Increased incentives for return to work

7% hearing loss threshold introduced.

Common law damages increased.

Credibility factor in premium calculation increased from 120,000 to 240,000.

Fringe benefits included in remuneration for premium calculations.

Additional lump sum payments for pain & suffering introduced.

Generic safety awareness multi-media advertising campaigns begin.

1995/96

Average premium rate maintained at 1.80% plus a decrease in surcharge to 10%, totalling 1.98%

Credibility factor in premium calculation increased from 240,000 to 360,000.

Generic safety awareness multi-media advertising campaigns continue.

1996/97

The Health & Safety Organisation and WorkCover merge in July 1996.

The 10% surcharge is removed; average premium rate is maintained at 1.8%.

Serious injury determinations for the purposes of common law changed to require 30% or greater impairment.

The definition of serious injury claims is changed in December 1996 to exclude psychological overlay on impairment tests.

Injury specific health and safety awareness campaigns begin.

1997/98

The average premium rate maintained at 1.8%; superannuation is included into remuneration from 1/1 /98.

Additional industry rates of 0. 3 3% and 8.4% introduced.

Multi-media advertising campaigns target specific accident types.

Major amendments made to Accident Compensation Act on 11 / 11 / 97 including:

Common law payments abolished for workers injured after I 1/ 11 / 97;

Weekly compensation reduced after 13 weeks of incapacity to 75% of pre-injury ordinary time weekly earnings;

Weekly benefits after 2 years of incapacity changed from 90% or 70% of pre-injury earnings, depending on level of incapacity, to 75%;

New Long Term Benefit of 60% of preinjury earnings less 60% of current earnings where the worker has a current work capacity and returned to work under their maximum capacity and satisfied specified criteria;

Table of Maims under S98 and S98A lump sum payments are abolished for claims injured after 11/ 11 / 97 and replaced by S98C, which is based on whole body impairment levels.

Appendix II: Regression equations incidence, duration and cost of workers compensation payments

Males

1. Males, Incidence of weekly payments

Variable	Coefficient	T-Value	
Constant	0.1126	2.872	
Age at Accident ((Years-40)/100)	0.3787	3.666	*Claimant*
Employer Remuneration ($mill.)	-0.0004	-6.458	*Employer*
Agent A			*Agent/Insurer*
Agent B	-0.0730	-1.786	
Agent C	-0.1184	-3.231	
Agent D	0.1429	3.741	
Agent E	0.0938	1.994	
Agent F	-0.3929	-1.779	
Agent G	-0.0027	-0.004	
Agent H	0.0802	1.268	
Agent I	0.1310	1.716	
Agent J	0.0752	1.064	
Agent K	-0.1959	-2.274	
Agriculture	0.7930	9.308	*Industry*
Mining	-0.2268	-1.393	
Manufacturing			
Electricity Gas & Water	-1.0105	-10.019	
Construction	0.4049	9.459	
Trade	-0.0006	-0.015	
Transport & Storage	0.2355	5.154	
Communication	-0.3662	-0.976	
Finance, Property & Business Services	-0.1739	-2.796	
Public Administration	-0.4579	-4.062	
Community Services	0.0299	0.730	
Recreation Personal & Other Services	-0.2712	-4.982	
Deafness	-4.6797	-12.120	*Affliction*
Sprains & Strains			
Open Wounds	0.3541	6.644	
Fractures	0.9188	16.919	
Contusions	0.2467	4.243	
Musculo-Skeletal Diseases	0.3143	1.739	
Dislocations	0.6970	4.350	
Internal Injuries	1.2536	13.033	
Superficial Injuries	0.3060	3.347	
Burns	0.8920	5.983	
Multiple Injuries	0.3008	1.596	
Stress	1.4811	16.145	
Circulatory Disease	-0.6671	-4.388	
Skin Diseases	-0.1001	-0.565	
Other	0.2024	2.695	
Head	-1.2856	-18.769	*Bodily Location*
Neck	-0.6048	-8.606	
Back			
Trunk	-0.2191	-2.903	
Upper Limbs	-0.2294	-6.146	
Lower Limbs	-0.0077	-0.199	
Multiple Locations/Other	-0.3584	-2.792	
Unknown/Not Coded	-1.3001	-10.293	
Fall of Person	0.3401	8.151	*Incident Type*
Falling Object/Substance	0.2763	2.930	
Stepping on/Struck by Object	-0.0111	-0.247	

Caught	0.2444	3.830	
Overexertion			
Exposure to Extreme Temperature	-0.1683	-1.122	
Contact with Electricity	0.2104	0.710	
Exposure to Toxic Substance	-0.5300	-1.315	
Explosion/Implosion	0.3294	0.951	
Repetition Injury	-0.0265	-0.277	
Other Types n.e.c.	-0.0848	-1.206	
Vehicle Accident	0.1804	1.654	
Unknown	-0.2426	-4.561	
Machinery	0.1150	2.155	*Agency of Injury*
Mobile Plant & Transport	0.0740	1.443	
Powered Tools & Equipment	0.1792	2.295	
Unpowered Tools & Equipment	0.0643	1.844	
Chemicals	0.0858	0.710	
Materials & Substances	0.0215	0.321	
Working Environment	-0.1364	-3.155	
Animal, Human & Biological	0.1322	2.521	
Other Agency n.e.c.			
Not Identified	-0.1954	-3.299	

Log-Likelihood	-19904.18
Restricted (Slopes=0) Log-Likelihood	-23184.61
Chi-Squared	6560.86

	Predicted			
Actual	No	Yes	Total	% Correct
No	8856	7780	16636	53.2
Yes	3920	12893	16813	76.7
Total	12776	20673	33449	65.0

2. Males, Durations

Variable	Coefficient	T-Value	
Constant	3.3198	78.287	
Age at Accident ((Years-40)/100)	1.6566	16.439	
Employed: PT/Work Experience/Unknown (Y/N)	0.1023	1.556	*Claimant*
Employer Remuneration ($mill.)			*Employer*
Time Elapsed: Injury => Agent	0.00098	7.219	*Timeliness*
Time Elapsed: Agent => 1st weekly payment	0.00069	6.524	
Rehabilitation (Y/N)	2.0027	66.915	*Medical Intervention*
Hospital (Y/N)	0.7678	30.0883	
Agent A			*Agent/Insurer*
Agent B	0.2808	6.868	
Agent C	0.0305	0.849	
Agent D	0.1474	4.337	
Agent E	0.0966	2.253	
Agent F	0.3083	1.769	
Agent G	0.6974	1.704	
Agent H	0.1209	2.162	
Agent I	-0.1670	-2.420	
Agent J	-0.0966	-1.437	
Agent K	0.0302	0.377	
Agriculture	0.0176	0.303	*Industry*
Mining	0.0145	0.091	
Manufacturing			

Electricity Gas & Water	-0.5313	-4.465	
Construction	0.0300	0.815	
Trade	-0.0106	-0.278	
Transport & Storage	-0.1015	-2.380	
Communication	-0.8899	-2.342	
Finance, Property & Business Services	0.0666	0.999	
Public Administration	-0.1836	-1.438	
Community Services	-0.2642	-6.767	
Recreation Personal & Other Services	0.0524	1.051	
Deafness	0.0156	0.061	*Affliction*
Sprains & Strains			
Open Wounds	-0.4905	-9.758	
Fractures	0.1665	4.101	
Contusions	-0.2161	-3.824	
Musculo-Skeletal Diseases	-0.0780	-0.496	
Dislocations	0.3057	2.197	
Internal Injuries	-0.4844	-5.707	
Superficial Injuries	-1.1457	-9.834	
Burns	-0.6474	-4.744	
Multiple Injuries	0.4505	1.847	
Stress	1.2344	9.458	
Circulatory Disease	0.8235	5.192	
Skin Diseases	-0.0918	-0.431	
Other	0.2905	3.387	
Head	-0.5715	-5.145	*Bodily Location*
Neck	0.0225	0.236	
Back			
Trunk	-0.5693	-7.058	
Upper Limbs	-0.3607	-9.051	
Lower Limbs	-0.4410	-11.075	
Multiple Locations/Other	-0.1530	-1.111	
Unknown/Not Coded	-0.2646	-1.662	
Fall of Person	0.0499	1.253	*Incident Type*
Falling Object/Substance	-0.0495	-0.607	
Stepping on/Struck by Object	-0.0256	-0.575	
Caught	-0.1278	-2.332	
Overexertion			
Exposure to Extreme Temperature	0.0460	0.294	
Contact with Electricity	0.4167	0.884	
Exposure to Toxic Substance	-0.7123	-1.730	
Explosion/Implosion	-0.1768	-0.674	
Repetition Injury	0.0873	0.821	
Other Types n.e.c.	-0.0665	-0.939	
Vehicle Accident	0.5048	3.465085	
Unknown	-0.0600	-1.073	
Machinery	-0.0046	-0.089	*Agency of Injury*
Mobile Plant & Transport	-0.0757	-1.638	
Powered Tools & Equipment	0.1117	1.337	
Unpowered Tools & Equipment	-0.0740	-2.255	
Chemicals	0.1669	1.408	
Materials & Substances	-0.0935	-1.484	
Working Environment	-0.0511	-1.236	
Animal, Human & Biological	0.0914	1.702	
Other Agency n.e.c.			
Not Identified	0.0137	0.239	

Current Work Capacity			*Severity*
No Current Work Capacity	0.0921	1.988	
Partial Temporary Injury			
Serious Injury	2.5925	23.210	
Total Temporary Injury			
Total & Permanent Injury	3.9001	19.867	
Working to Full Capacity			
No Code			
Sigma	1.1796	144.651	
Alpha	0.8477	157.276	*Negative Duration Dependence*
Gamma	0.0304		

Log-Likelihood	-26745.01
Restricted (Slopes=0) Log-Likelihood	-34867.27
Chi-Squared	16244.52

3. Males, Common Law Incidence

Variable	Coefficient	T-Value	
Constant	-3.7990	-23.861	
Weekly Pay at Accident ($000)	-0.6652	-3.526	
Age at Accident ((Years-40)/100)			*Claimant*
Employer Remuneration ($mill.)	-0.0005	-1.626	*Employer*
Agriculture	-0.6221	-2.782	*Industry*
Mining	-0.1236	-0.268	
Manufacturing			
Electricity Gas & Water	-0.4122	-1.359	
Construction	-0.6498	-5.238	
Trade	-0.3984	-3.616	
Transport & Storage	-0.3872	-2.911	
Communication	-4.3411	-0.420	
Finance, Property & Business Services	-0.2837	-1.489	
Public Administration	-0.8099	-1.953	
Community Services	-1.1761	-7.556	
Recreation Personal & Other Services	-0.7561	-3.949	
Deafness	-1.6667	-3.194	*Affliction*
Open Wounds	-0.0292	-0.155	
Fractures	0.0798	0.488	
Contusions	-0.0640	-0.326	
Musculo-Skeletal Diseases	0.6540	1.953	
Dislocations	0.2046	0.432	
Internal Injuries	-1.8598	-3.894	
Superficial Injuries	-0.8152	-1.658	
Burns	0.5617	1.331	
Multiple Injuries	-0.3490	-0.667	
Stress	-0.6046	-1.802	
Circulatory Disease	-2.0540	-3.188	
Skin Diseases	0.4606	0.860	
Other	0.0870	0.377	
Head	-0.5281	-2.329	*Bodily Location*
Neck	-0.3690	-1.780	
Back			
Trunk	-0.4568	-1.936	
Upper Limbs	-0.8184	-7.097	
Lower Limbs	-0.9256	-7.117	

Multiple Locations/Other	0.0971	0.310	
Unknown/Not Coded	-0.2881	-0.812	
Fall of Person	0.0641	0.552	*Incident Type*
Falling Object/Substance	0.3472	1.327	
Stepping on/Struck by Object	-0.2746	-1.750	
Caught	0.3988	2.114	
Overexertion			
Exposure to Extreme Temperature	-0.0490	-0.100	
Contact with Electricity	1.0135	1.722	
Exposure to Toxic Substance	-3.6756	-0.495	
Explosion/Implosion	0.4990	0.686	
Repetition Injury	-0.3836	-1.146	
Other Types n.e.c.	0.0772	0.381	
Vehicle Accident	-2.5765	-4.192	
Unknown	0.0435	0.255	
Current Work Capacity			*Severity*
No Current Work Capacity			
Partial Temporary Injury	2.1413	14.158	
Serious Injury	5.1763	33.168	
Total Temporary Injury	1.0820	7.791	
Total & Permanent Injury	4.4134	27.511	
Working to Full Capacity			
No Code			

Log-Likelihood	-3138.799
Restricted (Slopes=0) Log-Likelihood	-4691.619
Chi-Squared	3105.64

	Predicted			
Actual	No	Yes	Total	% Correct
No	32200	192	32392	99.4
Yes	757	300	1057	28.4
Total	32957	492	33449	97.2

4. Males, Common Law Damages

Variable	Mean Coefficient	T-Value	Variance Coefficient	T-Value	
Constant	11.0017	53.981			
Weekly Pay at Accident ($000)	0.5523	5.916	-0.4720	-1.889	
Age at Accident ((Years-40)/100)	-1.8379	-11.288	1.2359	3.090	*Claimant*
Head	-0.5108	-3.743	1.4135	7.562	*Bodily Location*
Neck	-0.0343	-0.333	0.1907	0.772	
Back					
Trunk	-0.1883	-1.710	0.4646	1.901	
Upper Limbs	-0.1310	-2.840	0.1480	1.294	
Lower Limbs	0.0225	0.406	-0.0643	-0.430	
Multiple Locations/Other	0.0237	0.216	-0.1364	-0.451	
Unknown/Not Coded	-0.2098	-1.210	0.3676	1.071	
Current Work Capacity					*Severity*
No Current Work Capacity	0.9178	4.184	-2.0469	-5.613	
Partial Temporary Injury	0.7061	3.411	-1.3033	-5.089	
Serious Injury	1.1767	5.789	-1.7377	-7.221	
Total Temporary Injury	0.6405	3.113	-1.0110	-4.148	
Total & Permanent Injury	0.9851	4.808	-1.7266	-6.855	

Working to Full Capacity
No Code

			1.2551	8.438	*Sigma*
Sample Size	1057	-955.64	Log-Likelihood		
		-1076.65	Restricted (Slopes=0) Log-Likelihood		
		242.00	Chi-Squared		

5. Males, Legal Payments Incidence

Variable	Coefficient	T-Value	
Constant	-2.0944	-25.407	
Weekly Pay at Accident ($000)	-0.5816	-6.249	
Age at Accident ((Years-40)/100)	1.3160	7.554	*Claimant*
Employer Remuneration ($mill.)			*Employer*
Agent A			*Agent/Insurer*
Agent B	-0.0226	-0.332	
Agent C	-0.2401	-4.123	
Agent D	-0.0754	-1.196	
Agent E	-0.0510	-0.672	
Agent F	-0.3072	-0.598	
Agent G	0.9734	1.116	
Agent H	0.0272	0.277	
Agent I	-0.1256	-0.856	
Agent J	-0.2997	-2.369	
Agent K	0.0784	0.569	
Agriculture	-0.4788	-3.542	*Industry*
Mining	0.2124	0.972	
Manufacturing			
Electricity Gas & Water	-0.1081	-0.768	
Construction	-0.3391	-5.062	
Trade	-0.3940	-5.935	
Transport & Storage	-0.3044	-4.200	
Communication	0.7435	1.456	
Finance, Property & Business Services	-0.1767	-1.761	
Public Administration	-0.5886	-3.029	
Community Services	-0.7607	-10.418	
Recreation Personal & Other Services	-0.4815	-4.777	
Deafness	0.7049	4.386	*Affliction*
Sprains & Strains			
Open Wounds	-0.2693	-2.563	
Fractures	0.0284	0.306	
Contusions	-0.0853	-0.772	
Musculo-Skeletal Diseases	-0.1786	-0.620	
Dislocations	0.1994	0.758	
Internal Injuries	-1.4906	-5.917	
Superficial Injuries	-1.4550	-4.520	
Burns	-0.1426	-0.519	
Multiple Injuries	0.7613	2.989	
Stress	0.8955	5.517	
Circulatory Disease	1.2230	6.246	
Skin Diseases	-0.5103	-1.274	
Other	0.3707	3.008	
Head	-0.7017	-5.152	*Bodily Location*
Neck	-0.1530	-1.325	

Back			
Trunk	-0.7661	-5.423	
Upper Limbs	-0.4899	-7.551	
Lower Limbs	-0.7624	-10.534	
Multiple Locations/Other	-0.0344	-0.177	
Unknown/Not Coded	0.1199	0.691	
Fall of Person	0.0647	0.941	*Incident Type*
Falling Object/Substance	-0.1895	-1.037	
Stepping on/Struck by Object	-0.0773	-0.906	
Caught	0.2907	2.672	
Overexertion			
Exposure to Extreme Temperature	-0.0304	-0.104	
Contact with Electricity	-0.0797	-0.177	
Exposure to Toxic Substance	0.5703	1.512	
Explosion/Implosion	0.9274	3.685	
Repetition Injury	0.0761	0.505	
Other Types n.e.c.	0.3440	3.766	
Vehicle Accident	0.0860	0.515	
Unknown	0.1501	1.864	
Current Work Capacity			*Severity*
No Current Work Capacity	0.5157	4.702	
Partial Temporary Injury	1.6276	22.136	
Serious Injury	4.0870	36.636	
Total Temporary Injury	0.6356	10.240	
Total & Permanent Injury	3.6996	33.025	
Working to Full Capacity			
No Code			

Log-Likelihood	-9174.032
Restricted (Slopes=0) Log-Likelihood	-11214.841
Chi-Squared	4081.618

	Predicted			
Actual	No	Yes	Total	% Correct
No	29646	301	29947	99.0
Yes	2703	799	3502	22.8
Total	32349	1100	33449	91.0

6. Males, Legal Payments

	Mean		Variance		
Variable	Coefficient	T-Value	Coefficient	T-Value	
Constant	8.3702	122.043			
Agriculture	-0.1067	-0.761	0.0691	0.440	*Industry*
Mining	-0.3262	-1.356	0.1210	0.460	
Manufacturing					
Electricity Gas & Water	-0.4978	-3.341	0.0675	0.392	
Construction	-0.1908	-2.717	0.0988	1.251	
Trade	-0.0793	-1.218	-0.0624	-0.802	
Transport & Storage	-0.0677	-0.876	0.0597	0.679	
Communication	-0.4925	-0.820	0.1391	0.219	
Finance, Property & Business Services	-0.1539	-1.450	0.0453	0.370	
Public Administration	0.1671	1.042	-0.4404	-1.881	
Community Services	-0.2411	-3.345	-0.1773	-1.944	

Recreation Personal & Other Services	-0.4678	-4.399	0.0175	0.142	
Deafness	-0.8463	-5.049	-0.0252	-0.128	*Affliction*
Sprains & Strains					
Open Wounds	0.0414	0.338	0.0731	0.540	
Fractures	-0.0325	-0.314	0.1257	1.099	
Contusions	-0.0553	-0.412	0.2566	1.852	
Musculo-Skeletal Diseases	0.3156	1.615	-0.5224	-1.788	
Dislocations	-0.1661	-0.599	0.0679	0.216	
Internal Injuries	-0.2884	-1.034	-0.3006	-0.893	
Superficial Injuries	0.6237	1.811	-0.2078	-0.466	
Burns	-0.2284	-0.773	0.7864	2.224	
Multiple Injuries	-0.0711	-0.317	-0.2454	-0.892	
Stress	0.3542	2.198	-0.1403	-0.716	
Circulatory Disease	0.5310	2.998	-0.4256	-1.877	
Skin Diseases	0.0521	0.081	0.8541	1.677	
Other	-0.0919	-0.690	0.1641	1.118	
Head	-0.2552	-1.804	-0.0063	-0.038	*Bodily Location*
Neck	-0.1745	-1.478	0.0127	0.093	
Back					
Trunk	0.0812	0.518	0.1503	0.856	
Upper Limbs	-0.3804	-5.589	0.0462	0.599	
Lower Limbs	-0.3011	-3.927	-0.0809	-0.898	
Multiple Locations/Other	0.1780	0.960	0.0128	0.061	
Unknown/Not Coded	0.2339	1.350	-0.0434	-0.214	
Fall of Person	0.0819	1.180	-0.0242	-0.298	*Incident Type*
Falling Object/Substance	-0.0318	-0.152	0.1171	0.529	
Stepping on/Struck by Object	-0.0899	-1.018	-0.0524	-0.504	
Caught	-0.0627	-0.471	0.1853	1.347	
Overexertion					
Exposure to Extreme Temperature	0.3968	1.653	-0.9470	-2.544	
Contact with Electricity	0.8747	2.895	-1.2899	-2.405	
Exposure to Toxic Substance	-0.1499	-0.323	0.0579	0.119	
Explosion/Implosion	-0.3676	-1.450	-0.0699	-0.228	
Repetition Injury	-0.0120	-0.080	-0.1440	-0.791	
Other Types n.e.c.	-0.1228	-1.260	0.1636	1.494	
Vehicle Accident	-0.5801	-3.134	0.1657	0.833	
Unknown	0.1452	1.881	-0.1601	-1.665	
Current Work Capacity					*Severity*
No Current Work Capacity					
Partial Temporary Injury	0.3769	4.815	0.1291	1.430	
Serious Injury	1.2550	16.620	-0.1855	-1.977	
Total Temporary Injury	0.4140	6.339	0.0819	1.063	
Total & Permanent Injury	0.9013	10.431	0.0349	0.343	
Working to Full Capacity					
No Code					
				24.538	*Sigma*
Sample Size	3502	-5668.46	Log-Likelihood		
		-5711.18	Restricted (Slopes=0) Log-Likelihood		
		85.44	Chi-Squared		

7. Males, Medical Payments Incidence

Variable	Coefficient	T-Value	
Constant	0.9986	16.855	
Weekly Pay at Accident ($000)	0.6916	10.540	
Age at Accident ((Years-40)/100)	-0.2134	-1.612	*Claimant*
Agent A			*Agent/Insurer*
Agent B	-0.0841	-1.601	
Agent C	-0.1077	-2.424	
Agent D	-0.0128	-0.260	
Agent E	0.0576	0.946	
Agent F	0.4268	1.300	
Agent G	-0.0589	-0.054	
Agent H	-0.3040	-3.970	
Agent I	0.2173	2.020	
Agent J	-0.0774	-0.850	
Agent K	-0.2043	-1.940	
Agriculture	-0.0186	-0.192	*Industry*
Mining	0.1545	0.767	
Manufacturing			
Electricity Gas & Water	0.0437	0.401	
Construction	0.1803	3.456	
Trade	0.2775	5.369	
Transport & Storage	0.1376	2.475	
Communication	1.3454	1.764	
Finance, Property & Business Services	0.1141	1.479	
Public Administration	0.1916	1.449	
Community Services	0.2646	5.303	
Recreation Personal & Other Services	0.5629	7.458	
Deafness	-2.3290	-21.203	*Affliction*
Sprains & Strains			
Open Wounds	0.5000	6.189	
Fractures	-0.4058	-6.175	
Contusions	0.0724	0.884	
Musculo-Skeletal Diseases	-0.4409	-2.008	
Dislocations	-0.0020	-0.009	
Internal Injuries	1.4986	11.298	
Superficial Injuries	0.7322	4.921	
Burns	0.1414	0.747	
Multiple Injuries	-0.3989	-1.707	
Stress	-1.7261	-15.353	
Circulatory Disease	-1.5770	-10.381	
Skin Diseases	-0.7948	-4.234	
Other	-0.6149	-6.984	
Head	0.4377	4.620	*Bodily Location*
Neck	0.3440	3.470	
Back			
Trunk	-0.3452	-3.971	
Upper Limbs	0.3066	5.991	
Lower Limbs	0.1605	3.086	
Multiple Locations/Other	0.0965	0.581	
Unknown/Not Coded	-0.1928	-1.451	
Fall of Person	0.2003	3.559	*Incident Type*
Falling Object/Substance	-0.1940	-1.632	
Stepping on/Struck by Object	0.1771	2.846	
Caught	0.2258	2.439	

Overexertion			
Exposure to Extreme Temperature	-0.5480	-3.036	
Contact with Electricity	1.4376	2.682	
Exposure to Toxic Substance	-0.4134	-1.338	
Explosion/Implosion	-0.0913	-0.399	
Repetition Injury	-0.2299	-2.034	
Other Types n.e.c.	-0.5573	-7.646	
Vehicle Accident	0.3031	2.011	
Unknown	-0.4448	-7.704	
Machinery	0.0590	0.798	*Agency of Injury*
Mobile Plant & Transport	-0.0715	-1.060	
Powered Tools & Equipment	-0.0177	-0.163	
Unpowered Tools & Equipment	0.0012	0.026	
Chemicals	0.3429	2.254	
Materials & Substances	0.2659	2.680	
Working Environment	-0.0966	-1.914	
Animal, Human & Biological	-0.1966	-3.077	
Other Agency n.e.c.			
Not Identified	-0.1111	-1.755	
Current Work Capacity			*Severity*
No Current Work Capacity			
Partial Temporary Injury	1.0179	14.144	
Serious Injury	4.2805	7.364	
Total Temporary Injury			
Total & Permanent Injury	3.8632	6.652	
Working to Full Capacity			
No Code			

Log-Likelihood	-14085.71
Restricted (Slopes=0) Log-Likelihood	-17622.290
Chi-Squared	7073.16

	Predicted			
Actual	No	Yes	Total	% Correct
No	2773	4584	7357	37.7
Yes	1021	25071	26092	96.1
Total	3794	29655	33449	83.2

8. Males, Medical Payments

*	Mean		Variance		
Variable	Coefficient	T-Value	Coefficient	T-Value	
Constant	5.8992	144.058			
Weekly Pay at Accident ($000)	0.6845	16.467	-0.0353	-0.595	
Age at Accident ((Years-40)/100)	1.3217	15.679	-0.6191	-5.106	*Claimant*
Agent A					*Agent/Insurer*
Agent B	0.1240	3.695	-0.0044	-0.094	
Agent C	0.0390	1.363	-0.0264	-0.639	
Agent D	0.0724	2.314	0.0557	1.277	
Agent E	0.0976	2.599	-0.0038	-0.071	
Agent F	0.5759	3.964	-0.4685	-1.843	
Agent G	0.0275	0.021	1.3808	1.641	
Agent H	0.2812	5.810	-0.1238	-1.674	
Agent I	0.0155	0.239	0.0787	0.902	

Agent J	-0.0991	-1.772	-0.0737	-0.906	
Agent K	0.1799	2.422	0.0903	0.893	
Agriculture	-0.2620	-3.716	0.3102	3.455	*Industry*
Mining	-0.0160	-0.129	-0.0525	-0.286	
Manufacturing					
Electricity Gas & Water	-0.3484	-4.441	0.1694	1.561	
Construction	-0.1235	-3.680	0.1334	2.790	
Trade	-0.0441	-1.416	0.1027	2.293	
Transport & Storage	-0.1777	-4.771	0.1194	2.254	
Communication	-0.0281	-0.073	0.5023	1.189	
Finance, Property & Business Services	-0.0915	-1.880	-0.0442	-0.604	
Public Administration	-0.3596	-3.484	0.2595	1.937	
Community Services	-0.5006	-15.289	0.1775	3.940	
Recreation Personal & Other Services	-0.2367	-5.335	0.0527	0.829	
Deafness	0.4423	5.010	-0.0460	-0.363	*Affliction*
Sprains & Strains					
Open Wounds	-0.0746	-1.613	0.1775	2.915	
Fractures	0.3062	7.189	0.0012	0.020	
Contusions	-0.2318	-4.454	0.2197	3.288	
Musculo-Skeletal Diseases	0.3730	2.456	0.0938	0.429	
Dislocations	0.4734	3.642	0.0730	0.416	
Internal Injuries	0.7859	11.571	-1.8630	-17.183	
Superficial Injuries	-0.7738	-11.822	-0.4434	-4.361	
Burns	-0.4426	-3.323	0.1610	0.948	
Multiple Injuries	0.3817	2.436	-0.0726	-0.320	
Stress	0.1056	1.177	0.1540	1.279	
Circulatory Disease	-0.1953	-0.905	0.7991	3.566	
Skin Diseases	-0.5508	-2.790	0.2155	0.920	
Other	-0.0466	-0.747	-0.1050	-1.142	
Head	-0.0958	-1.676	-0.0626	-0.799	*Bodily Location*
Neck	-0.0744	-1.239	0.0957	1.177	
Back					
Trunk	-0.0682	-1.005	-0.0076	-0.082	
Upper Limbs	0.0311	0.993	-0.0006	-0.013	
Lower Limbs	0.2847	8.681	0.0098	0.215	
Multiple Locations/Other	0.3033	2.750	-0.0104	-0.068	
Unknown/Not Coded	0.0995	0.861	0.1551	0.984	
Fall of Person	0.0752	2.204	0.0550	1.152	*Incident Type*
Falling Object/Substance	-0.1753	-2.135	0.1369	1.280	
Stepping on/Struck by Object	-0.0694	-1.812	0.0825	1.581	
Caught	0.2474	4.820	-0.1206	-1.673	
Overexertion					
Exposure to Extreme Temperature	-0.2487	-1.878	0.1012	0.577	
Contact with Electricity	0.4921	2.685	-0.5123	-1.624	
Exposure to Toxic Substance	-0.3478	-0.789	0.6567	1.511	
Explosion/Implosion	0.4089	2.178	-0.2902	-0.944	
Repetition Injury	0.0235	0.312	-0.1259	-1.086	
Other Types n.e.c.	-0.0188	-0.297	0.1771	2.079	
Vehicle Accident	0.4840	5.475	-0.0022	-0.018	
Unknown	-0.1845	-3.967	0.1089	1.708	
Machinery	0.0995	2.359	-0.0108	-0.179	*Agency of Injury*
Mobile Plant & Transport	0.1278	3.107	-0.0282	-0.482	
Powered Tools & Equipment	0.0909	1.382	0.0392	0.443	
Unpowered Tools & Equipment	0.0495	1.780	-0.0113	-0.282	
Chemicals	-0.0013	-0.011	0.2674	1.892	

Materials & Substances	-0.2058	-4.002	-0.0720	-0.955	
Working Environment	-0.0191	-0.547	-0.0378	-0.769	
Animal, Human & Biological	0.0878	1.880	0.0120	0.189	
Other Agency n.e.c.					
Not Identified	0.0424	0.888	-0.0351	-0.508	
Current Work Capacity					*Severity*
No Current Work Capacity	0.9907	21.125	0.0779	1.218	
Partial Temporary Injury	1.4006	38.828	-0.0934	-1.789	
Serious Injury	3.5076	74.005	-0.8775	-9.285	
Total Temporary Injury	0.5068	20.743	0.0109	0.323	
Total & Permanent Injury	2.9173	64.699	-1.1205	-10.935	
Working to Full Capacity					
No Code					
			1.5054	34.068	*Sigma*
Sample Size	26092	-47674.15	Log-Likelihood		
		-51612.85	Restricted (Slopes=0) Log-Likelihood		
		7877.41	Chi-Squared		

Females

1. Females, Incidence of weekly payments

Variable	Coefficient	T-Value	
Constant	0.2758	3.813	
Age at Accident ((Years-40)/100)	0.5119	2.853	*Claimant*
Employer Remuneration ($mill.)	-0.0003	-5.926	*Employer*
Agent A			*Agent/Insurer*
Agent B	0.0478	0.718	
Agent C	0.0674	1.109	
Agent D	0.1600	2.557	
Agent E	0.1671	2.043	
Agent F	-0.3757	-2.441	
Agent G	0.2413	0.785	
Agent H	0.0365	0.402	
Agent I	0.2736	1.760	
Agent J	0.4866	4.180	
Agent K	-0.0057	-0.045	
Agriculture	0.4787	3.059	*Industry*
Mining	0.5551	0.449	
Manufacturing			
Electricity Gas & Water	-1.2060	-2.234	
Construction	0.3697	1.510	
Trade	-0.2158	-2.957	
Transport & Storage	-0.0991	-0.696	
Communication	-1.8141	-2.283	
Finance, Property & Business Services	-0.2019	-2.336	
Public Administration	-0.1415	-1.127	
Community Services	-0.0435	-0.751	
Recreation Personal & Other Services	-0.0213	-0.263	

Deafness			*Affliction*
Sprains & Strains			
Open Wounds	0.2970	2.517	
Fractures	0.9102	9.321	
Contusions	0.2207	2.151	
Musculo-Skeletal Diseases	0.3764	1.191	
Dislocations	0.0932	0.349	
Internal Injuries	1.0308	3.181	
Superficial Injuries	0.1914	0.737	
Burns	0.8509	2.559	
Multiple Injuries	0.7009	2.281	
Stress	1.8509	13.672	
Circulatory Disease	-0.7918	-1.496	
Skin Diseases	0.0848	0.327	
Other	0.5001	5.497	
Head	-1.7036	-13.902	*Bodily Location*
Neck	-0.5838	-7.603	
Back			
Trunk	-0.4900	-3.040	
Upper Limbs	-0.2593	-4.805	
Lower Limbs	-0.2148	-3.148	
Multiple Locations/Other	-0.7598	-4.486	
Unknown/Not Coded	-1.0035	-4.961	
Fall of Person	0.0254	0.374	*Incident Type*
Falling Object/Substance	-0.2238	-1.128	
Stepping on/Struck by Object	0.0007	0.009	
Caught	0.4396	2.914	
Overexertion			
Exposure to Extreme Temperature	-0.6470	-1.839	
Contact with Electricity	-0.1123	-0.228	
Exposure to Toxic Substance	-1.6337	-1.487	
Explosion/Implosion	-0.4980	-0.689	
Repetition Injury	-0.0538	-0.572	
Other Types n.e.c.	-0.3428	-3.179	
Vehicle Accident	0.1121	0.527	
Unknown	-0.2005	-2.439	
Machinery	0.2176	1.850	*Agency of Injury*
Mobile Plant & Transport	0.0851	0.789	
Powered Tools & Equipment	-0.2684	-2.395	
Unpowered Tools & Equipment	0.0865	1.471	
Chemicals	0.2846	1.356	
Materials & Substances	-0.1406	-0.650	
Working Environment	-0.0359	-0.530	
Animal, Human & Biological	0.2357	3.766	
Other Agency n.e.c.			
Not Identified	0.0150	0.170	

Log-Likelihood	-7727.572
Restricted (Slopes=0) Log-Likelihood	-8051.139
Chi-Squared	647.134

	Predicted			
Actual	No	Yes	Total	% Correct
No	2109	3305	5414	39.0
Yes	1493	4751	6244	76.1
Total	3602	8056	11658	58.8

2. Females, Duration

Variable	Coefficient	T-Value	
Constant	3.9907	50.306	
Age at Accident ((Years-40)/100)	1.6194	9.067	*Claimant*
Employer Remuneration ($mill.)	-0.0001	-1.600	*Employer*
Time Elapsed: Injury => Employer	0.00052	2.297	*Timeliness*
Time Elapsed: Employer => Agent	0.00005	0.119	
Time Elapsed: Agent => 1st weekly payment	0.00074	5.458	
Rehabilitation (Y/N)	1.9027	45.235	*Medical Intervention*
Hospital (Y/N)	0.7236	16.9225	
Agent A			*Agent/Insurer*
Agent B	0.2893	3.989	
Agent C	-0.1134	-1.943	
Agent D	-0.0151	-0.254	
Agent E	0.0894	1.152	
Agent F	0.0872	0.67293	
Agent G	-0.4023	-1.605	
Agent H	0.2056	2.347	
Agent I	-0.0824	-0.625	
Agent J	0.0786	0.754	
Agent K	0.2611	1.841	
Agriculture	0.1189	1.068	*Industry*
Mining	-2.3977	-3.558	
Manufacturing			
Electricity Gas & Water	0.1938	0.682	
Construction	-0.0630	-0.284	
Trade	-0.3398	-4.842	
Transport & Storage	-0.3748	-2.362	
Communication	1.4699	6.720	
Finance, Property & Business Services	-0.2270	-2.491	
Public Administration	-0.5726	-3.983	
Community Services	-0.3920	-6.424	
Recreation Personal & Other Services	-0.1860	-2.295	
Deafness			*Affliction*
Sprains & Strains			
Open Wounds	-0.8722	-8.734	
Fractures	-0.1919	-2.866	
Contusions	-0.2226	-1.973	
Musculo-Skeletal Diseases	0.1433	0.517	
Dislocations	-0.1250	-0.580	
Internal Injuries	-0.3384	-1.265	
Superficial Injuries	-0.4494	-1.473	

Burns	-0.8080	-4.340	
Multiple Injuries	0.8121	2.776	
Stress	0.7011	4.365	
Circulatory Disease	-0.0572	-0.284	
Skin Diseases	-0.2290	-0.688	
Other	0.0312	0.355	
Head	-0.3812	-2.521	*Bodily Location*
Neck	-0.1078	-1.155	
Back			
Trunk	-0.6503	-3.860	
Upper Limbs	-0.2214	-4.149	
Lower Limbs	-0.4971	-7.573	
Multiple Locations/Other	-0.2379	-1.161	
Unknown/Not Coded	-0.2721	-1.049	
Machinery	-0.0829	-0.812	*Agency of Injury*
Mobile Plant & Transport	-0.0992	-0.934	
Powered Tools & Equipment	-0.0609	-0.535	
Unpowered Tools & Equipment	-0.0643	-1.094	
Chemicals	0.2597	1.454	
Materials & Substances	0.6083	2.866	
Working Environment	-0.0727	-1.187	
Animal, Human & Biological	-0.0347	-0.583	
Other Agency n.e.c.			
Not Identified	-0.0195	-0.231	
Current Work Capacity			*Severity*
No Current Work Capacity			
Partial Temporary Injury			
Serious Injury	2.4628	12.984	
Total Temporary Injury			
Total & Permanent Injury	3.9956	11.859	
Working to Full Capacity			
No Code			
Sigma	1.2322	98.576	
Alpha	0.8116	84.273	*Negative Duration Dependence*
Gamma	0.0211		

Log-Likelihood	-10007.58
Restricted (Slopes=0) Log-Likelihood	-12643.23
Chi-Squared	5271.3

3. Females, Common Law Incidence

Variable	Coefficient	T-Value	
Constant	-4.6272	-19.672	
Weekly Pay at Accident ($000)			
Age at Accident ((Years-40)/100)	1.9434	3.559	*Claimant*
Employer Remuneration ($mill.)	-0.0012	-3.846	*Employer*
Head	-1.4757	-5.826	*Bodily Location*
Neck	-0.8373	-3.231	
Back			
Trunk	-0.7048	-1.697	
Upper Limbs	-0.5726	-4.309	
Lower Limbs	-0.9115	-4.250	
Multiple Locations/Other	-0.2969	-0.698	

Unknown/Not Coded	-1.4568	-2.254	
Current Work Capacity			*Severity*
No Current Work Capacity			
Partial Temporary Injury	2.0927	8.284	
Serious Injury	5.4204	20.418	
Total Temporary Injury	1.3921	5.734	
Total & Permanent Injury	4.3066	16.227	
Working to Full Capacity			
No Code			

Log-Likelihood	-1304.891
Restricted (Slopes=0) Log-Likelihood	-1850.731
Chi-Squared	1091.68

	Predicted			
Actual	No	Yes	Total	% Correct
No	11162	63	11225	99.4
Yes	326	107	433	24.7
Total	11488	170	11658	96.7

4. Females, Common Law Damages

Variable	Mean Coefficient	T-Value	Variance Coefficient	T-Value	
Constant	10.9103	26.192			
Weekly Pay at Accident ($000)	0.7616	4.495	-0.6390	-1.248	
Age at Accident ((Years-40)/100)	-1.7948	-6.819	0.0808	0.106	*Claimant*
Current Work Capacity					*Severity*
No Current Work Capacity	0.7205	1.688	-3.4702	-4.999	
Partial Temporary Injury	0.5623	1.348	-2.0267	-4.929	
Serious Injury	1.0091	2.434	-2.4573	-6.129	
Total Temporary Injury	0.6107	1.464	-1.6413	-4.096	
Total & Permanent Injury	0.8138	1.960	-2.6601	-6.443	
Working to Full Capacity					
No Code					
			1.7171	4.842	*Sigma*
Sample Size	433	-335.12	Log-Likelihood		
		-390.93	Restricted (Slopes=0) Log-Likelihood		
		111.61	Chi-Squared		

5. Females, Legal Payments Incidence

Variable	Coefficient	T-Value	
Constant	-2.3397	-19.606	
Weekly Pay at Accident ($000)	-0.5030	-2.903	
Age at Accident ((Years-40)/100)	1.9461	6.615	*Claimant*
Employer Remuneration ($mill.)	-0.0040	-3.139	*Employer*
Agriculture	-0.6881	-3.030	*Industry*
Mining	-4.6935	-0.386	
Manufacturing			
Electricity Gas & Water	-4.1939	-0.821	
Construction	-0.7560	-1.904	
Trade	-0.5253	-4.777	

Transport & Storage	-0.8776	-3.419	
Communication	-0.2304	-0.207	
Finance, Property & Business Services	-0.4440	-3.369	
Public Administration	-1.1652	-5.080	
Community Services	-0.8512	-10.027	
Recreation Personal & Other Services	-0.6894	-5.347	
Machinery	0.1153	0.685	*Agency of Injury*
Mobile Plant & Transport	-0.1390	-0.921	
Powered Tools & Equipment	-0.5078	-2.371	
Unpowered Tools & Equipment	-0.2091	-2.233	
Chemicals	-0.2324	-0.738	
Materials & Substances	0.7025	2.522	
Working Environment	-0.0610	-0.614	
Animal, Human & Biological	-0.1124	-1.078	
Other Agency n.e.c.			
Not Identified	0.1817	1.419	
Current Work Capacity			*Severity*
No Current Work Capacity			
Partial Temporary Injury	1.7428	16.654	
Serious Injury	4.1789	24.473	
Total Temporary Injury	1.0825	11.523	
Total & Permanent Injury	3.6849	22.956	
Working to Full Capacity			
No Code			

Log-Likelihood	-3554.858
Restricted (Slopes=0) Log-Likelihood	-4281.674
Chi-Squared	1453.632

	Predicted			
Actual	No	Yes	Total	% Correct
No	10117	140	10257	98.6
Yes	1076	325	1401	23.2
Total	11193	465	11658	89.6

6. Females, Legal Payments

Variable	Mean Coefficient	T-Value	Variance Coefficient	T-Value	
Constant	7.9146	84.911			
Current Work Capacity					*Severity*
No Current Work Capacity					
Partial Temporary Injury	0.5690	4.811	0.212	1.538	
Serious Injury	1.5671	12.715	-0.211	-1.351	
Total Temporary Injury	0.8518	8.181	-0.074	-0.583	
Total & Permanent Injury	1.0341	7.825	0.023	0.142	
Working to Full Capacity					
No Code					
			1.1716	17.776	*Sigma*

Sample Size	1401	-2205.62	Log-Likelihood
		-2212.04	Restricted (Slopes=0) Log-Likelihood
		12.85	Chi-Squared

7. Females, Medical Payments Incidence

Variable	Coefficient	T-Value	
Constant	1.0719	15.572	
Weekly Pay at Accident ($000)	0.8396	6.970	*Claimant*
Deafness	-2.7339	-9.268	*Affliction*
Sprains & Strains			
Open Wounds	-0.0141	-0.089	
Fractures	-0.1195	-0.925	
Contusions	0.2568	1.612	
Musculo-Skeletal Diseases	-0.3234	-0.785	
Dislocations	-0.0190	-0.055	
Internal Injuries	0.5085	1.396	
Superficial Injuries	-0.3354	-1.107	
Burns	0.9158	2.004	
Multiple Injuries	0.0013	0.003	
Stress	-1.5221	-8.326	
Circulatory Disease	-1.3870	-3.059	
Skin Diseases	-0.9785	-3.856	
Other	-0.2596	-2.227	
Head	-0.0319	-0.184	*Bodily Location*
Neck	0.2158	1.959	
Back			
Trunk	-0.6806	-3.644	
Upper Limbs	0.1357	1.831	
Lower Limbs	-0.1287	-1.400	
Multiple Locations/Other	-0.1804	-0.817	
Unknown/Not Coded	-0.7897	-3.574	
Fall of Person	0.4238	4.759	*Incident Type*
Falling Object/Substance	0.8074	2.383	
Stepping on/Struck by Object	0.4198	3.879	
Caught	0.2923	1.439	
Overexertion			
Exposure to Extreme Temperature	-1.0516	-2.538	
Contact with Electricity	2.2890	2.168	
Exposure to Toxic Substance	1.2581	1.373	
Explosion/Implosion	0.0320	0.032	
Repetition Injury	0.1424	1.080	
Other Types n.e.c.	-0.4544	-3.887	
Vehicle Accident	0.6803	2.160	
Unknown	-0.2237	-2.329	
Current Work Capacity			*Severity*
No Current Work Capacity			
Partial Temporary Injury	1.3421	13.220	
Serious Injury	3.3885	5.774	
Total Temporary Injury			
Total & Permanent Injury	5.9857	2.634	

Working to Full Capacity
No Code

Log-Likelihood	-4935.402
Restricted (Slopes=0) Log-Likelihood	-5656.740
Chi-Squared	1442.676

	Predicted			
Actual	No	Yes	Total	% Correct
No	462	1745	2207	20.9
Yes	256	9195	9451	97.3
Total	718	10940	11658	82.8

8. Females, Medical Payments

	Mean		Variance		
Variable	Coefficient	T-Value	Coefficient	T-Value	
Constant	6.6061	113.506			
Weekly Pay at Accident ($)	0.3478	4.864	-0.0246	-0.370	
Age at Accident ((Years-40)/100)	1.3180	9.077	-0.1113	-0.813	*Claimant*
Agriculture	-0.4001	-3.268	0.1114	0.979	*Industry*
Mining	0.2782	0.424	-0.5982	-0.725	
Manufacturing					
Electricity Gas & Water	-0.3190	-1.183	-0.6820	-1.914	
Construction	0.1005	0.519	0.0893	0.488	
Trade	-0.0289	-0.524	-0.0804	-1.455	
Transport & Storage	-0.1905	-1.666	0.0844	0.796	
Communication	0.0863	0.226	-0.4883	-1.086	
Finance, Property & Business Services	0.0310	0.464	0.0080	0.122	
Public Administration	-0.2160	-2.356	-0.0876	-0.978	
Community Services	-0.2723	-6.495	0.0391	0.964	
Recreation Personal & Other Services	0.0442	0.729	-0.1318	-2.168	
Deafness	-0.9771	-4.162	-0.8983	-2.836	*Affliction*
Sprains & Strains					
Open Wounds	-0.2036	-2.280	0.2037	2.590	
Fractures	0.1829	2.611	0.0744	1.146	
Contusions	-0.1789	-2.288	0.1442	2.044	
Musculo-Skeletal Diseases	0.4366	1.838	0.0866	0.365	
Dislocations	-0.1670	-0.737	0.1417	0.716	
Internal Injuries	1.1660	5.218	-0.8399	-3.504	
Superficial Injuries	-0.5346	-2.197	0.4027	2.097	
Burns	-0.8740	-4.724	0.0232	0.133	
Multiple Injuries	0.5690	2.232	0.1140	0.494	
Stress	-0.0657	-0.514	0.3237	2.889	
Circulatory Disease	0.1934	0.420	-0.4492	-0.946	
Skin Diseases	-0.8672	-3.833	0.0203	0.095	
Other	-0.0314	-0.472	-0.0310	-0.460	
Head	-0.1737	-1.638	-0.0625	-0.661	*Bodily Location*
Neck	0.0720	1.254	-0.1640	-2.907	
Back					
Trunk	-0.6582	-4.326	0.2140	1.677	
Upper Limbs	-0.0637	-1.558	-0.1881	-4.704	
Lower Limbs	-0.0034	-0.064	0.0121	0.246	

Multiple Locations/Other	0.1651	1.142	0.0184	0.144	
Unknown/Not Coded	-0.3961	-1.976	0.4875	3.088	
Current Work Capacity					*Severity*
No Current Work Capacity					
Partial Temporary Injury	1.2692	27.841	-0.2332	-5.274	
Serious Injury	3.2841	44.630	-0.9380	-9.662	
Total Temporary Injury	0.2131	5.650	0.0203	0.599	
Total & Permanent Injury	2.6102	41.714	-1.2208	-12.904	
Working to Full Capacity					
No Code					
			1.6255	36.563	*Sigma*

Sample Size	9451	-17353.29	Log-Likelihood
		-17516.57	Restricted (Slopes=0) Log-Likelihood
		326.56	Chi-Squared