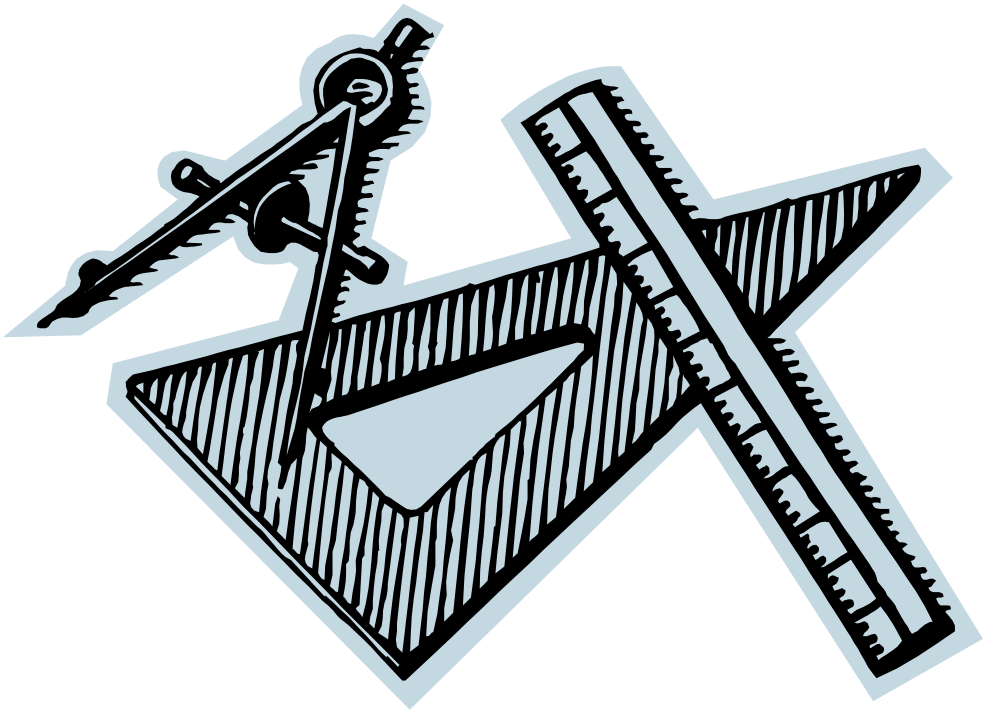
# Measuring Return to Work
# Controlling for the Effects of Industry and Size



**May 2005**

**Washington State Department of Labor and Industries**
**Research and Data Services**

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Department of LABOR AND INDUSTRIES

Washington State Department of Labor and Industries

***Measuring Return to Work:*** *Controlling for the Effects of Size and Industry*

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**RESEARCH AND DATA SERVICES**
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## Executive Summary

In this report we present the second in a series of reports on the return to work patterns of injured Washington workers. The reports are Labor and Industries' response to a recommendation by the Joint Legislative Audit and Review Committee (JLARC) that the Department should emphasize successful return to work in measuring claims management performance. The first report, published in November 2002, established an initial set of return to work benchmark measures using data from injury years 1997 –1998. This report covers injury years 1999-2000. The employment patterns of the injured workers are examined for eight quarters pre and post-injury.

This study utilizes employment data through 2002 to examine earnings and employment patterns of injured workers. When available, seventeen quarters of earnings data was gathered for each worker: eight quarters of data prior to the injury, the injury quarter, and eight quarters following. The earnings data is limited to Washington State. In order to isolate the impact of the occupational injury on employment and earnings as opposed to other factors, injured workers with time loss were compared to those with minor injury claims involving no loss time. The difference in how the two groups perform in the labor market is expected in large part to be due to the effects of the injury, as each, in theory, should be responding in a similar manner to external and personal factors. **We have termed this unemployment due to injury "excess unemployment."**

There are three major caveats in this analysis:

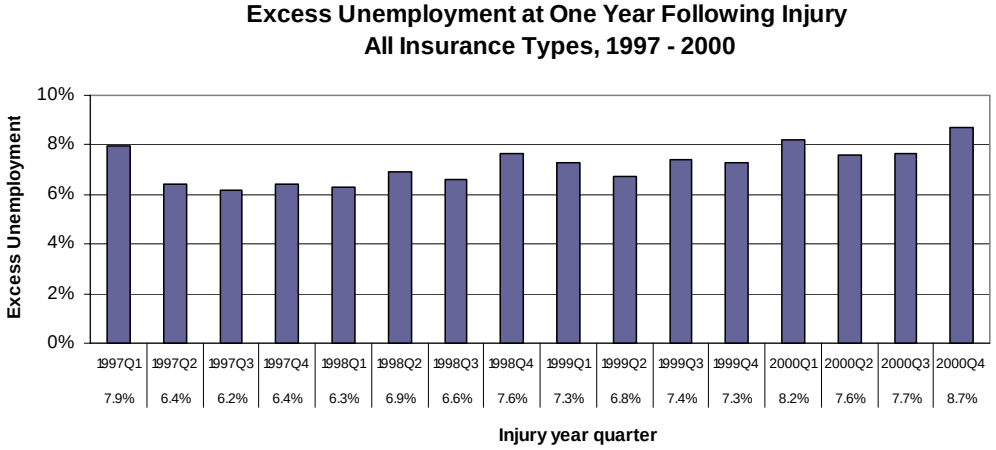
1. An ideal comparison group would be a group of individuals demographically identical to the time loss group but without an occupational injury. Due to data limitations, the creation of such a group was not possible.
2. Only Washington State earnings and employment data was available for the analysis.
3. Differences exist between reporting of self-insured claims and state fund claims. The extent to which these differences impact the composition of the self-insured time loss group versus medical only group is not fully understood. The share of medical only group claims is smaller in the self-insured group; this could mean that minor injuries involving no loss time are less likely to be reported to the Department. It could also be that the distribution is different because of the industrial composition of the self-insured group and the type of injuries that occur.

## Key findings

Excess unemployment -- the unemployment due to injury -- has increased in recent periods. We combined data from injury years 1999-2000, with data from the October 2002 return to work report (1997 –1998 injuries) to obtain 4 years of injury data for the analysis. At one year following injury, excess unemployment varied between 6.2% and 8.7% and is increasing. When we evaluate the return to work outcome one year following injury, workers who were injured in 1999 – 2000 had less success returning to work than those injured in 1997 –1998.

**Finding 1**: Excess unemployment at one year following injury has increased:

1997 Q1 – 1998 Q4 quarterly average = 6.8%
1999 Q1 – 2000 Q4 quarterly average = 7.6%

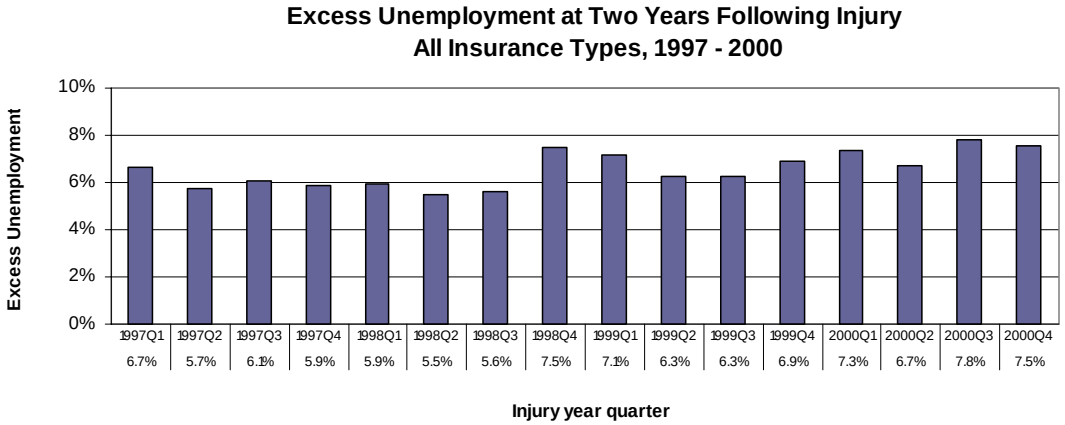



**Finding 2**: Increasing excess unemployment is largely apparent in the state fund figures while the self-insured have not experienced much change in the excess unemployment rate.

1997 Q1 – 1998 Q4 State Fund average = 10.5%
1999 Q1 – 2000 Q4 State Fund average = 11.6%

1997 Q1 – 1998 Q4 Self-Insured average = 1.9%
1999 Q1 – 2000 Q4 Self-Insured average = 1.8%

The trend in the data at two years following injury is very similar to that seen at one year. Average excess unemployment increased to an 8-quarter average of 7.0% in the recent period up from 6.1% in the first eight quarters.



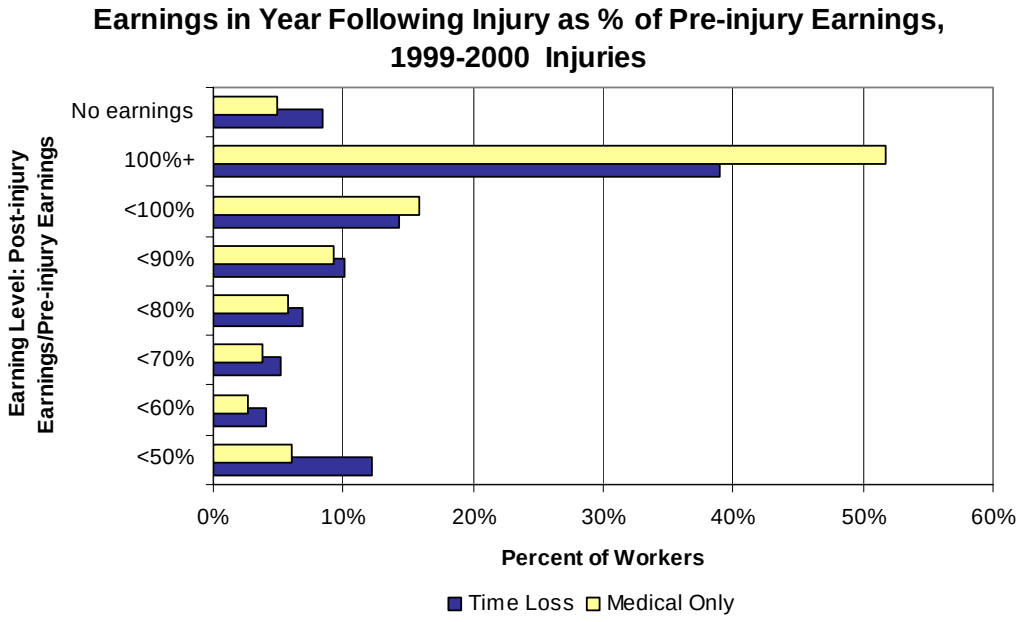

**Finding 3**: As with the one-year measure, the majority of the increase was due to the state fund excess unemployment, although the self-insured average was up slightly.

1997 Q1 – 1998 Q4 State Fund average = 9.4%
1999 Q1 – 2000 Q4 State Fund average = 10.7%

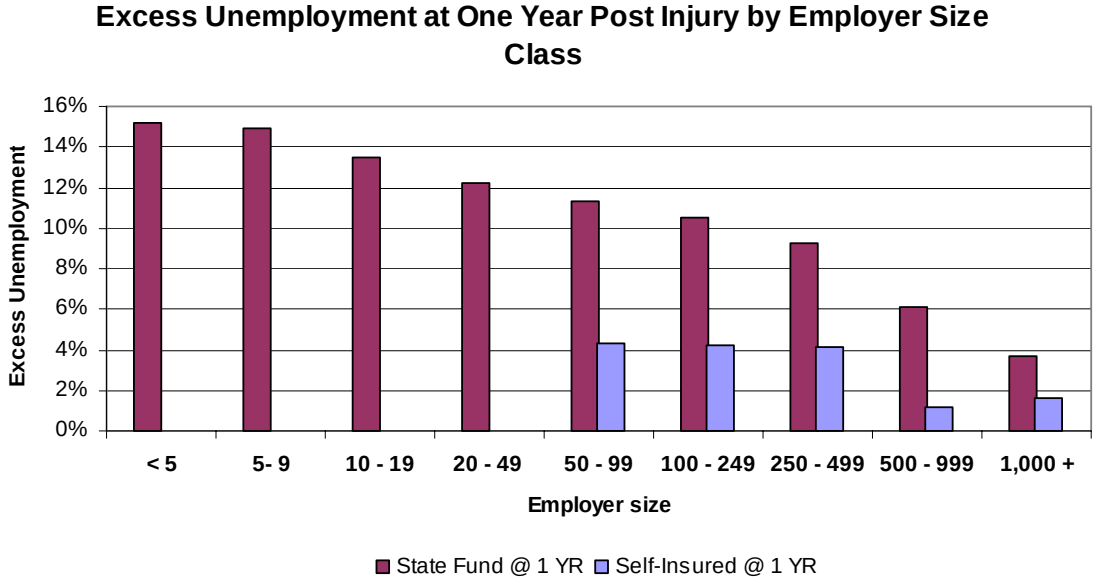
1997 Q1 – 1998 Q4 Self-Insured average = 1.8%
1999 Q1 – 2000 Q4 Self-Insured average = 2.0%

When a worker incurs an injury that requires time off work, the odds are that their earnings in the year following will suffer. The impact of injury on a worker's earning's capacity diminishes with time but remains significant. During the second year following injury the share of the time loss group earning wages equal to or greater than their pre-injury wages is still 9% less than the medical only group.

**Finding 4:** Earnings suffer with injury; the share of injured workers in the time loss group earning at least pre-injury wages at one year post injury is 12.7 % less than the medical only group.



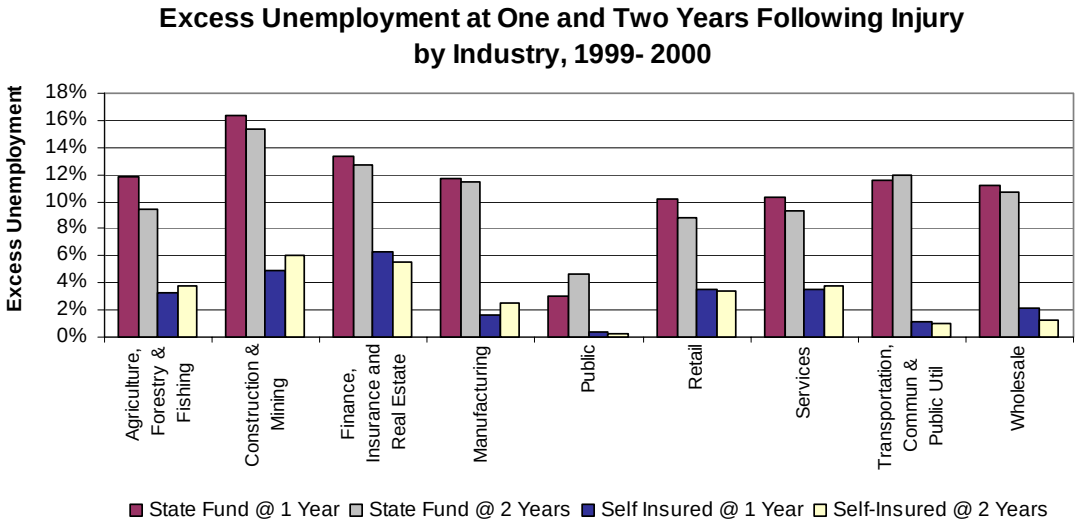

**Finding 5:** Excess unemployment declines as size of firm increases.




Size of firm is negatively correlated with excess unemployment and explains part of the observed differences in return to work outcomes between the state fund and self-insured time loss groups. The larger the firm, the less likely the injured worker will suffer unemployment due to injury. This is true in both the state fund and self-insured groups and demonstrates how differences in firm size may

cause overall excess unemployment numbers to be higher for the state fund, which is heavily weighted towards smaller size firms. About 83% of self-insured employment is in firms with 1000+ employees compared to about 8% of total state fund employment.

**Finding 6:** Excess unemployment also varies by industry. Those employed in the construction sector are least likely to be employed at one and two years following injury than those working in other industries. About 95% of construction hours are reported by state fund firms.




**What factors affect return to work?**

From the charts above, it is clear that the likelihood of employment following injury is related to factors such as firm size and industry: other studies point to a host of other factors affecting return to work. The state fund has a higher concentration of workers with factors that are known to make their employment more tenuous than those of its self-insured counterpart. In doing any type of comparative analysis it is necessary to control for this to the extent possible. In this report we attempt to control for group differences through the use of a comparison group and later in the report through the use of logistic regression.

**Finding 7:** Before controlling for factors such as age and industry, a self-insured time loss claimant's odds of being employed at one year following injury are 167% higher than that of a state fund time loss claimant. After controlling for factors such as age and industry, the odds are reduced to 63% higher than a

state fund claimant. Differences in group characteristics likely explain a significant share of the differences seen in the excess unemployment measures between the state fund and self insured.

The factors that showed a positive return to work outcome among the state fund time loss group included: female, married, lower injury age, public sector employment, larger firm size, stable pre-injury employment and pre-injury earnings. The factors showing a negative return to work outcome included construction or manufacturing employment, and older age (those over 55).

# Introduction

## Background

### JLARC audit

The Joint Legislative Audit and Review Committee (JLARC) commissioned a performance audit of the Department of Labor and Industries in 1998. A series of recommendations for enhancing system performance and providing timely relief to injured workers was issued in the same year. In general, the audit found that the Department delivered high quality benefits at low comparative cost.

One of many JLARC recommendations that the Department agreed with was recommendation number 6: *The measurement of claims management performance should be changed to emphasize prompt payment, three-party contact, and successful return to work.* At the time, the Department had no way to measure successful return to work. The benchmarks presented in this study are the outgrowth of the Department's response to that portion of recommendation number 6.

### Cautions on comparisons with other states

Many states and organizations use return to work as a benchmark of system performance. The Workers' Compensation Research Institute routinely publishes comparisons of various systems using return to work as a measure. When comparing the results of any such analysis it is important to know how the particular entity is calculating and presenting the measure.

A variety of return to work measures exist, most with limitations. Some states present the percent employed as their benchmark measure. While employment gives a clear picture of what is happening to injured workers when they leave the system, it is limited in its value as a monitoring tool for worker's compensation system performance because it does not control for external factors such as fluctuations in the state's economy. Other return to work measures are based on reports of an injured worker's initial return to work made to the workers' compensation system at claim closure; the limitation of return to work at closure is that it fails to present any sort of post-injury longitudinal information. Baldwin et al (1996) are careful to point out that first return to work is not necessarily a measure of success. We believe our measure to be an adequate general representation of the injured workers' experience in Washington State following

injury because we compare workers with time loss to those with medical only claims and follow them over two years.

## Review of Existing Literature

A multitude of factors impact return to work: age, education, gender, injury severity, psychosocial and socio-economic factors as well as firm characteristics like industry and size. Younger employees have a higher incidence of return to work than their older counterparts (Baldwin, et al. 1996; Butler, et al. 2001; MacKenzie, et al. 1998). These results could be mitigated by the findings that when younger workers are injured, they do not sustain as severe injuries as older workers. This hypothesis was supported by Dasinger's et al. (2000) research, which indicates that younger age is a predictor of reduced disability.

In addition to age, education level may also be a predictor of return to work, since educated workers tend to return to work more quickly than less educated ones (Butler, 2001; Kearney, 1997). The relationship between education and speed of return to work is likely due to the fact that education level often dictates whether one is employed in a white-collar or blue-collar job. Kearney's 1997 return to work survey demonstrated that blue-collar workers such as factory workers, trade workers, and truck drivers were among the claimants who were most likely to have not returned to work when surveyed at one and two year intervals after work stoppage. Mackenzie et al. (1998), in his study of factors influencing return to work following lower extremity fractures, found that those who were employed in white-collar jobs have a higher incidence of return to work. While it is possible that there is something inherently different between white-collar and blue-collar workers with regard to return to work attitudes/patterns, it is more likely that less physically demanding (typically white-collar jobs) are easier on the body, and, therefore, can better accommodate people who are recovering from injuries.

The role of gender in return to work is not as clear as some of the previously mentioned variables; there are some discrepancies in the literature. Butler (2001) found that gender did not impact the probability of returning to work. Contrary to these findings, in his study of L & I compensable claims and Employment Security earning reports, Biddle (1998) found that men with short duration claims (<31 days) return to work more quickly and women return quicker on claims lasting more than 31 days in duration. Galizzi and Boden (2000) found similar results in their study, which indicated that women take longer to return to work for claims resulting in a short time off work.

Injury severity is another common thread in the return to work literature. Back injuries, when measured by duration of time away from work, tend to be one of the most severe injuries sustained by an injured worker, accounting for the largest mean time away from work (Baldwin, et al. 1996; Crook & Muldofsky, 1994; Fulton-Kehoe, et al. 2000). Reville and colleagues (2001) found that

claimants with the least severe injuries were more likely to return to work quickly. The implication was that workers with the least severe injuries were more likely to be accommodated by the employers, and therefore, returned to work more quickly (Reville, et al. 2001).

The role of psychosocial factors cannot be ignored. Depressive symptoms, resulting from being out of a job, can have significant impacts on how capable workers feel about returning to work, which can, in turn, decrease return to work rates (Franche & Krause, 2002).

Economic conditions and incentives are also thought to play a role in return to work. A review of economic studies by the Workers Compensation Research Institute suggests that workers are sensitive to economic incentives, some more so than others, and that a 20 percent increase in benefits increases duration for temporary total disability cases and permanent partial disability cases by 4 percent to 2-3 percent respectively (Gardner, 1989). More recent studies suggest that these affects may be overstated (Butler 2001; Dasinger 2000).

The effect of the overall economy on workers' compensation is less well understood. Reville, Schoeni, and Martin, in their study of the impact of economic conditions on the workers' compensation system in California (2001), found that improved economic conditions following the recession of the early 1990's might have played a small role in the decline in earnings losses seen for California's permanent partial disability claimants during the early 1990's. However, the authors suggest that economic conditions explain only a small portion of the decline. They theorize that it is more likely that an increase in claim frequency during the early 90s overwhelmed firms, hampering their ability to handle claims in a way that minimized losses. As insurance costs increased, firms began to place more emphasis on return to work resulting in declining earnings losses.

Galizzi and Boden (1996) were one of the first research teams to acknowledge firm size as an important factor in return to work. Their study of the Wisconsin workers' compensation system yielded results, which indicated that employees from smaller firms were much less likely to return to their pre-injury employers. A possible explanation for this finding is that larger firms are more likely to be able to afford to hold an employee's position open for a longer period of time and also have the resources to provide more opportunities for job modification than smaller firms (Galizzi & Boden, 1996).

Another reason that may help to explain why larger firms seem to get workers back on the job quicker is that since 1992 all firms with 25 people or more are mandated to make reasonable accommodations for persons with disabilities in accordance with the Americans with Disabilities Act (ADA) (Mueller, 1999). However, the impact of the ADA as it relates to observed differences in return to work between large and small employers is not well documented.

The correlation between size of firm and whether or not it is self-insured has been attributed to observed differences in return to work rates in large and small firms. Larger firms are more likely to be self-insured. Self-insured firms follow the pattern that larger firms do, in that their employees are more likely to return to work than employees of insured firms. A report by Reville, Polich, Seabury and Giddens, (2001) suggests that the differences may be due to the number of people employed in self-insured firms in addition to the differences in pre-injury wages.

Existing literature has pointed to the concept of return to work outcomes differing across industrial sectors. Baldwin et al. (1996) found that men employed in the fields of manufacturing or public administration returned to work faster than men employed in other industries. Kearney's (1997) cross-national survey of injured workers demonstrated that unskilled workers were less likely to have returned to work at the time of survey. These findings are supported by MacKenzie's et al. (1998) study that examined job-related factors impacting return to work.

Return to work is an increasingly common benchmark used to assess the overall effectiveness of a workers' compensation system; however, it is clear that there are many limitations and difficulties inherent to measuring return to work. The factors being examined in the current study focus on characteristics of the injured worker and the employer. Plans for future return to work analysis include looking more broadly at external factors that influence return to work outcomes such as the role that the external economic environment plays in return to work rates.

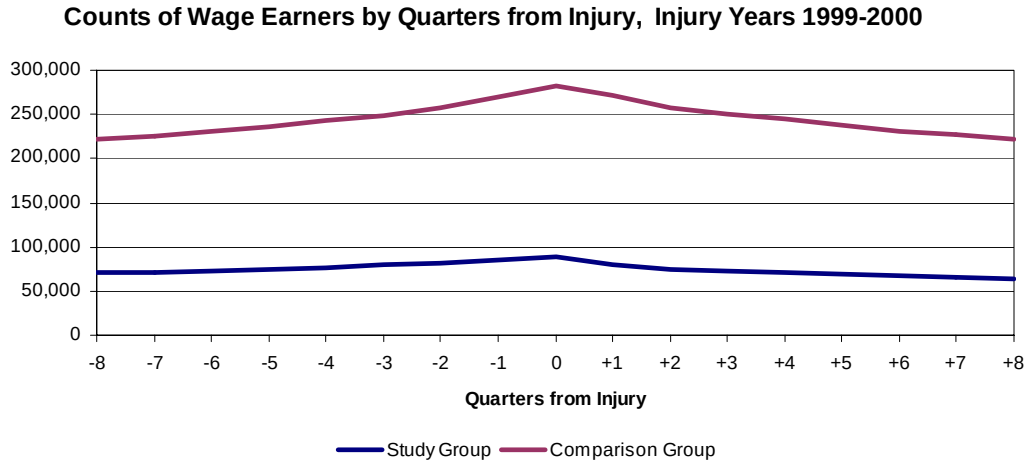
## Research Design

In order to evaluate the work patterns of injured workers, wage data was obtained via a research data-sharing contract with the Department of Employment Security. This data is confidential; findings stemming from this research are published only in the aggregate.

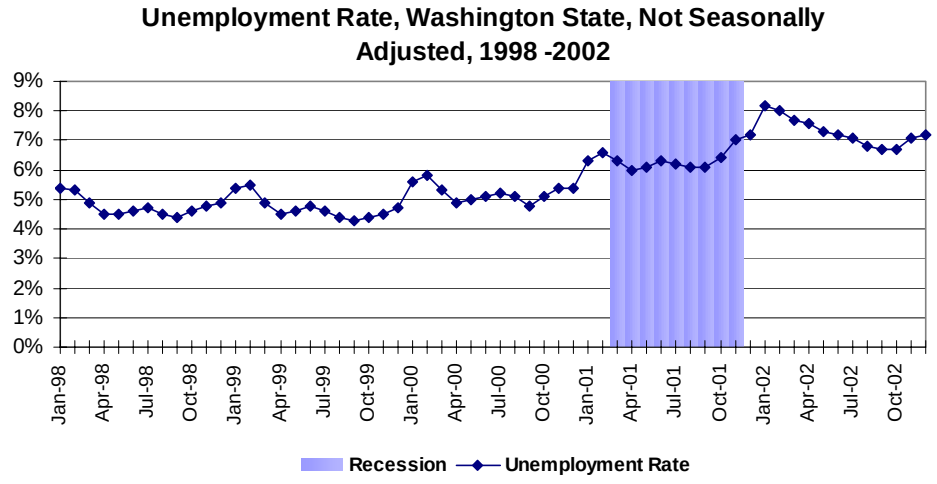
### Limitations/difficulties in measuring return to work

Difficulties exist with all forms of return to work measures. Many factors affect earnings and employment: the economy, migration, retirement, population growth, demographic changes and personal reasons such as marriage, raising children, illness, schooling, and more. These factors may affect employment rates over time, and any defined group observed over a period of time will likely show a decline in the percentage employed. The chart below demonstrates this by showing the number employed in both the time loss group and medical only group for the eight quarters prior to the injury, the injury quarter and the eight

quarters following injury. The use of the medical only group as a comparison group helps to control for this natural attrition.




The specific role that a state's economic condition plays on the return of injured workers to the workplace is not fully understood. It is interesting to note that the increase in excess unemployment at one and two years following injury occurred at a time when Washington, like many states, was in the midst of a recession. While Washington's unemployment rate was low by historical standards, it was at times the highest in the nation. The significance of this will be better understood in the future when additional quarters of return to work data become available during periods of more favorable economic conditions.




Source: Washington State Employment Security Department

## Data

We selected claims for the study based on claim status code, including medical only, time loss, and loss of earning power (LEP). "Medical only" claims (n=287,169 or 76%) involve the payment of medical expenses only, but the injured worker may be off work for up to three days. "Time loss" claims (n=91,062 or 24%), also called temporary total disability claims (TTD), involve workers who miss more than three days of work after a work related injury. Payments to injured workers with time loss are intended to partially replace wages. LEP claims, a subset of time loss claims, involve cases where the worker is not fixed and stable but is able to return to some form of work. Payments for those on LEP are intended to supplement reduced income. If a worker had multiple claims in the study quarter, the claim with the earliest injury date was selected, with time loss claims taking precedence over medical only claims. The social security numbers of injured workers were then matched to the Employment Security wage files to obtain wage records before and after quarter of injury. Records for the injured workers were then separated into two groups, "time loss" (the study group) and "medical only" (the comparison group).

## "Time loss" claims

The time loss group represents workers who were unable to work for some period after a workplace injury. Workers in this group received either a time loss or loss of earning power (LEP) payment, or both following the injury. In order to isolate changes in employment status due to factors other then the injury we used a comparison group of medical only claims.

## "Medical only" claims

Individuals with medical only claims were used to construct a comparison group. These claims are generally for minor injuries that do not cause much interruption in the claimant's work. Ideally, the comparison group would be comprised of workers who never suffered a workplace injury. Unfortunately many data elements that are needed for a thorough analysis of return to work patterns of injured workers are not available in external databases. Data limitations made constructing such a group impractical. Using medical only claims gives us a good comparison group allowing us to compare experience across a wide range of factors including employer size, industry, injury type, age, gender and occupation among others. Although many medical only claims can become time loss claims, we selected claims retrospectively such that claims had at least two years to develop, thereby limiting the probability a medical only claim would become a time loss claim.

### Group demographics

In order to rule out other factors affecting return to work, it is important that members of the comparison group be similar in demographic, industrial, occupational, and wage earning capacity to the time loss group. Distributions by age, gender, industry and other factors were compared. Descriptive statistics on the composition of the time loss group and medical only group are provided in Appendix A.

While overall differences in composition between the time loss group and the medical only group for each insurance type are small, inter-group differences between the self-insured and state fund groups are apparent; workers injured while employed by self-insured firms tend to earn higher wages and be concentrated in certain industries, and the share of medical only group claims is smaller in the self-insured group which could mean that minor injuries involving no loss time are less likely to be reported to the Department.

| | Time Loss Claims | Medical Only Claims (< 3 days time loss) |
|---|---|---|
| State Fund | 21.9% | 78.1% |
| Self-Insured | 29.3% | 70.7% |

## Methodology

### Data extraction

We queried the Department of Labor and Industries data warehouse, extracting records for injured workers with valid social security numbers and excluding records for workers younger than 16 or older than 70 years of age.

Claims data were grouped based on the injury quarter, and data for return to work rates is presented by injury quarter. For example, the post injury return to work (RTW) rate for workers injured in the first quarter of 1999 will be represented in the RTW rate for 1999 – Q1, the rate presented for 1999 – Q2 represents the return to work rate for workers injured in the second quarter of 1999.

### Matching records

The next step in the analysis involved matching the claimant records to the employment security wage files. We developed a multi-step matching process

using social security numbers (SSN) and name. The process was complicated by the existence in both databases of multiple individuals (based on name) having identical social security numbers.

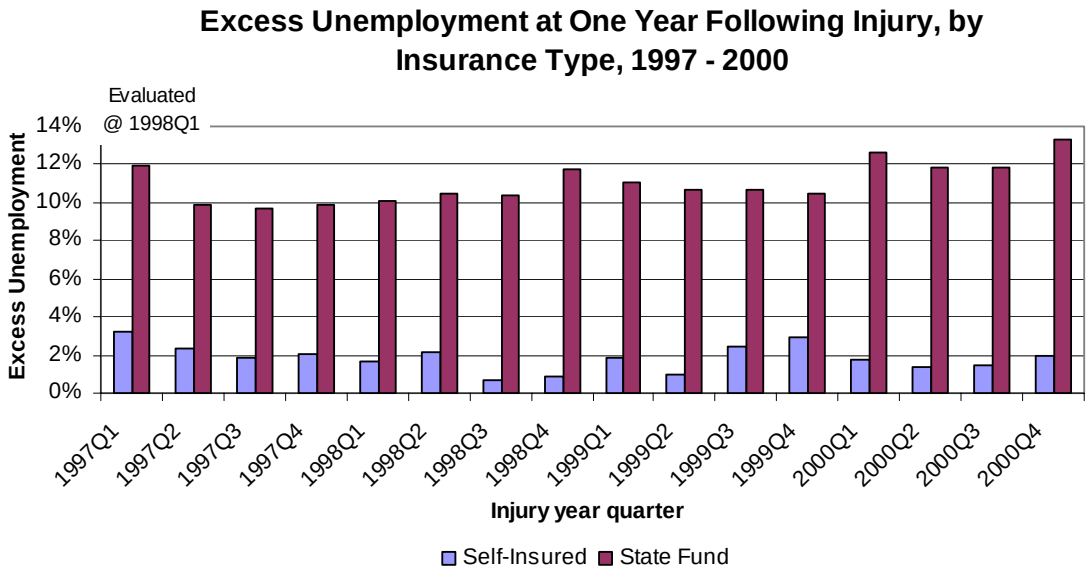
Once we matched the Labor and Industries record to a wage record, we obtained wage data for the injured worker for the eight quarters prior to the injury (Q -8 – Q -1), the quarter of injury (Q0), and the eight quarters following injury (Q 1 – Q 8). We included only those cases where wage records were found in at least one of the four quarters before the injury or in the injury quarter. This mechanism excluded injured workers who may be outside of the coverage of the unemployment insurance system and for whom it would be unlikely to find post injury wage records. In making this decision, a portion of injured workers who received workers' compensation but whose wages were not reported to Employment Security are excluded from this study.

### Wage adjustments

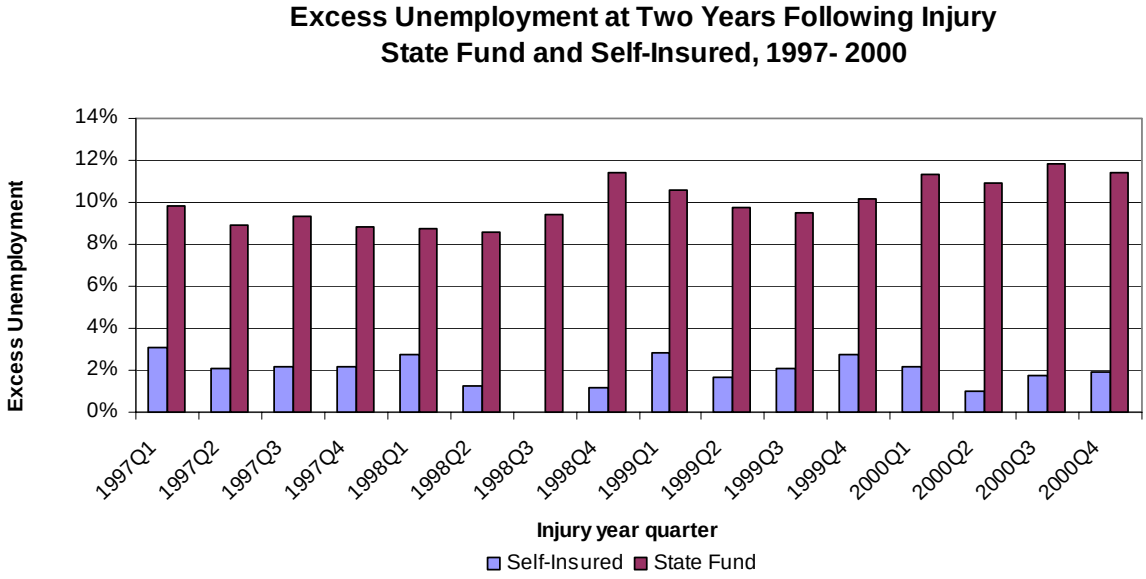
We adjusted wage data for inflation using the non-seasonally adjusted Consumer Price Index for All Urban Consumers (CPI-U) U.S. City Average (Bureau of Labor Statistics). Occasionally wage outliers are found on the wage file. This occurs due to a number of reasons, stock options for example. These outliers affect any analysis that involves looking at average wages, or post injury wages as a percentage of pre-injury wages. For this reason, wage data used in this analysis was capped at the 99th percentile wage. The cutoff value for each quarter was based on all wages reported in the quarter.

## Ongoing Measures

Combining data from the previous report on return to work, we are able to show excess unemployment by insurance type for injuries occurring in 1997-2000. State fund excess unemployment at one year has increased in recent periods.




The trend in the data at two years following injury is very similar with increasing excess unemployment being seen primarily in the state fund.



## Why Industry and Size of Firm are Important

### Industry

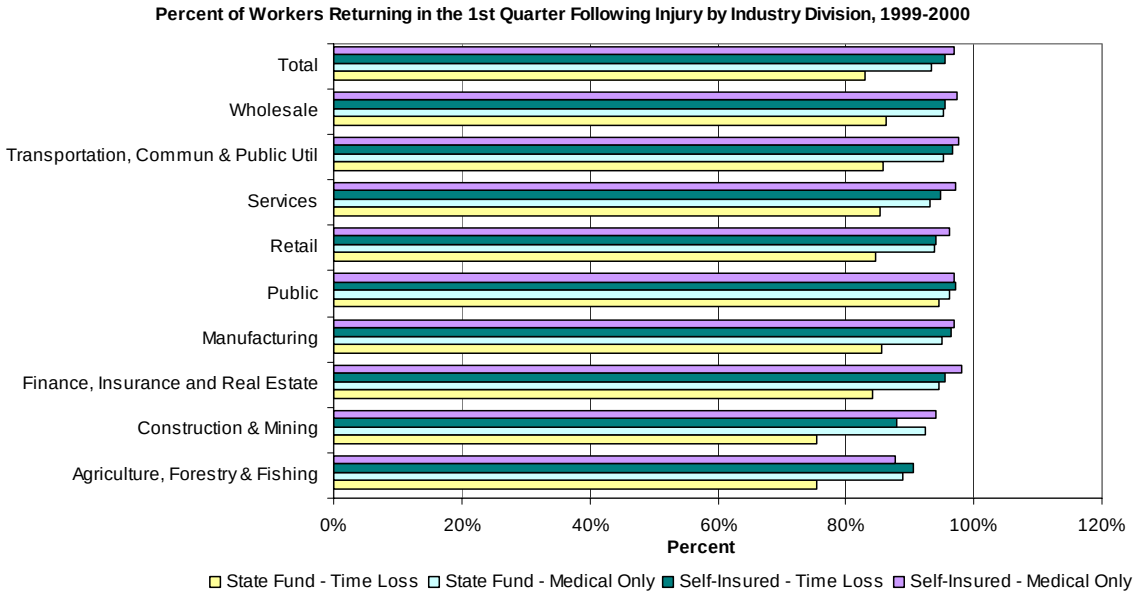
Construction and agriculture, because of their seasonal and transient employment patterns are more problematic than other industries when trying to measure return to work.

Washington has many migrant farm workers. Their presence in the state is often temporary and it is expected that they will have more gaps in employment than those in non-agricultural industries. Farm workers are often based out of the state or country. When seriously injured, they may return home and thus drop off the wage files. The migrant farm workers are frequently of Hispanic origin. Differences in naming conventions and inconstancies in data entry often result in Hispanic names being captured differently on administrative data files. For instance, last names were often listed in the place of first names. This caused unique matching difficulties.

Construction employment is very seasonal with calendar quarters 2 and 3 (April-September) traditionally having higher employment than quarters 1 and 4 (October-March), due to the winter weather. Washington's construction employment has remained fairly strong compared to the other industries in the latest recession, benefiting from low interest rates; however this does not eliminate issues of seasonality.

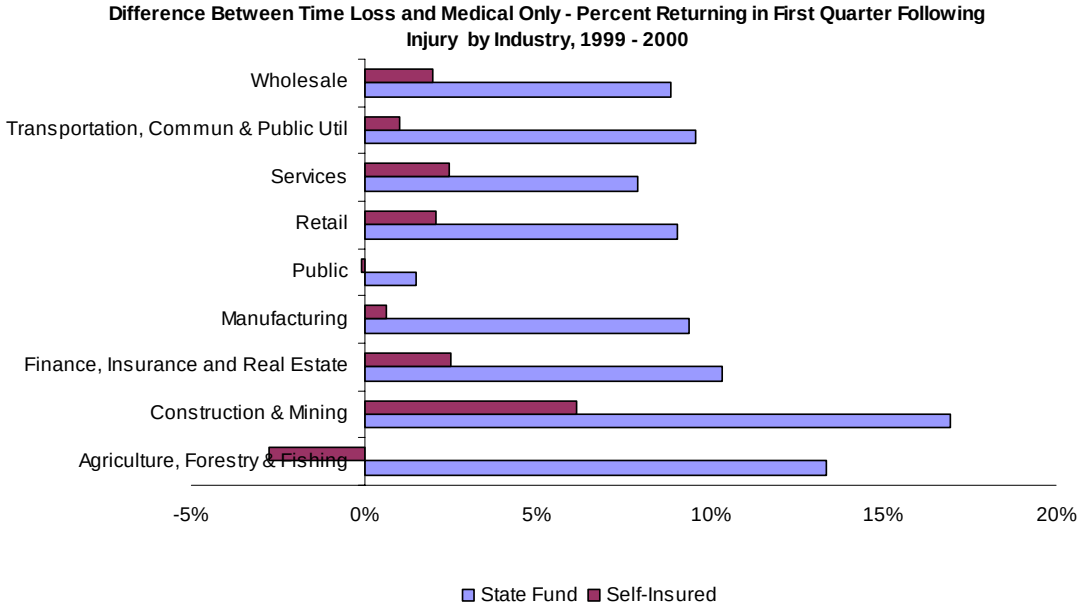
To the extent possible the use of a comparison group addresses the problematic issue of tracking employment in construction and agriculture. The medical only group is assumed to be as transient and seasonal as the time loss group. However, some differences in composition between the time loss and medical only comparison groups likely remain in these key industries, and further analysis is needed, including additional analysis of pre-injury employment patterns.

Workers injured in construction and agriculture do not return to work as quickly as those in other industries; only about 75% of state fund time loss group workers in construction and agriculture were found employed in the first quarter following injury as compared to other sectors where about 86% were found employed in the quarter following injury.

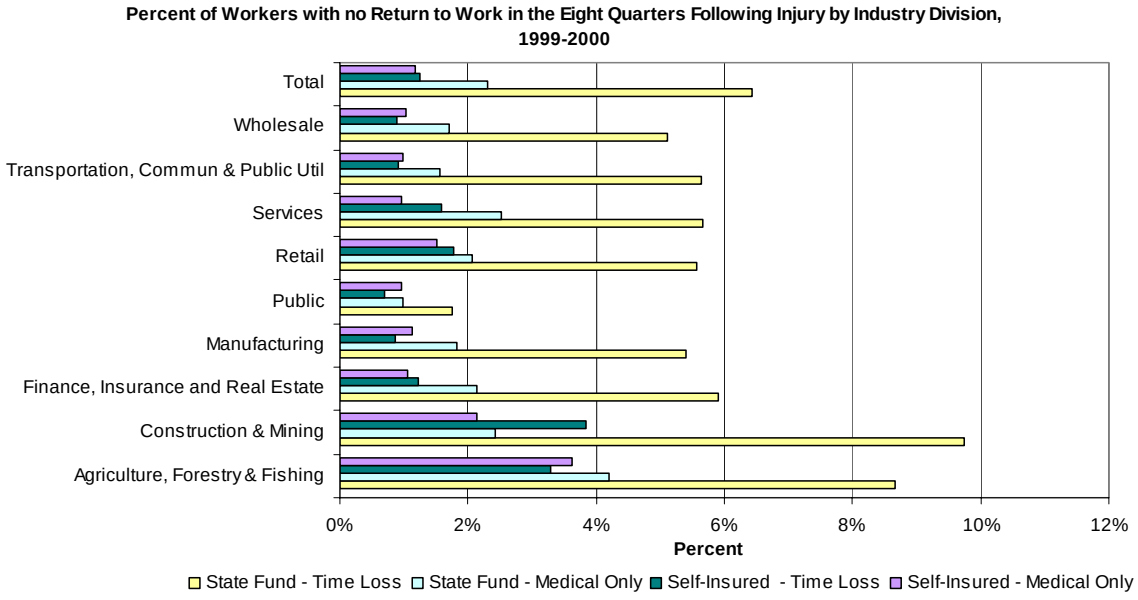



The chart below shows just the difference between the time loss and medical only groups, in terms of the share of workers returning to work in the quarter following injury, making the variation by industry easier to recognize.

**Construction workers have the highest excess unemployment in the first quarter following injury.**

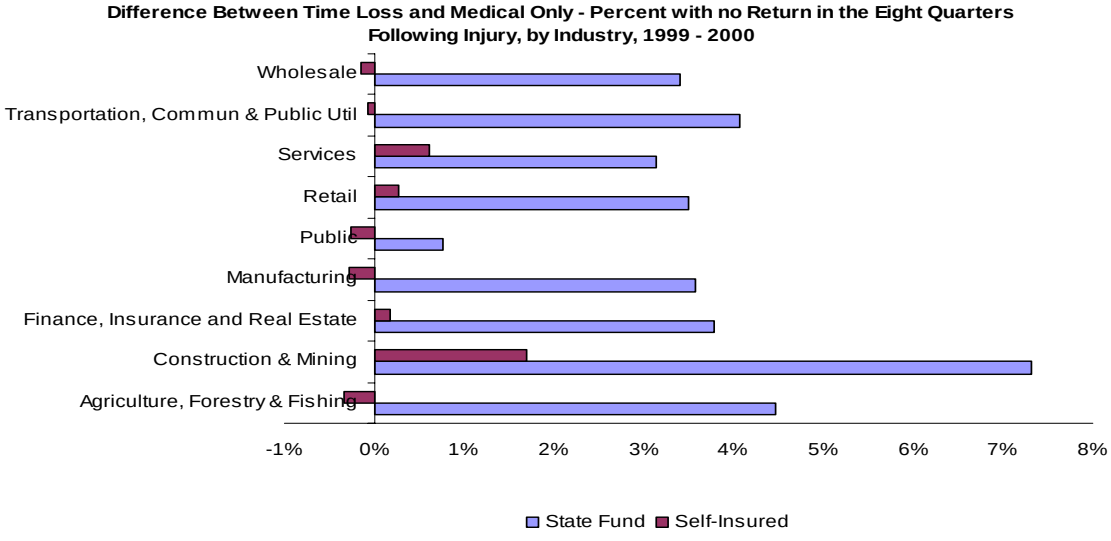


In addition to being less likely to be employed in the quarter following injury, workers in agriculture and construction were less likely to be found employed at any time in the two years following injury.




Again, charting just the difference between the time loss and medical only groups, makes it easier to see that injured workers without employment in any of eight quarters following injury are most pronounced in construction. Negative values in the chart mean that more injured workers with time loss claims were found employed than were injured workers with medical only claims.

**Construction workers are least likely to have employment in the two years following injury.**



The table below shows that the composition of the state fund and self-insured differs with regard to industrial composition. While the state fund dominates in construction, agriculture, and finance, self-insured firms are most likely to be in manufacturing, public administration and transportation.

| Industry | Percent of Total Year 2000 Reported Industry Hours Covered by State Fund Firms | Percent of Total Year 2000 Reported Industry Hours Covered by Self-insured Firms |
|---|---|---|
| AGRICULTURE, FORESTRY, AND FISHING | 95% | 5% |
| CONSTRUCTION | 95% | 5% |
| FINANCE, INSURANCE, AND REAL ESTATE | 81% | 19% |
| MANUFACTURING | 49% | 51% |
| MINING | 82% | 18% |
| PUBLIC ADMINISTRATION | 57% | 43% |
| RETAIL TRADE | 75% | 25% |
| SERVICES | 72% | 28% |
| TRANS, COMM, ELEC., GAS AND SANITARY SERVICES | 59% | 41% |
| WHOLESALE TRADE | 79% | 21% |

Source: Hours reported to the Washington State Department of Labor and Industries

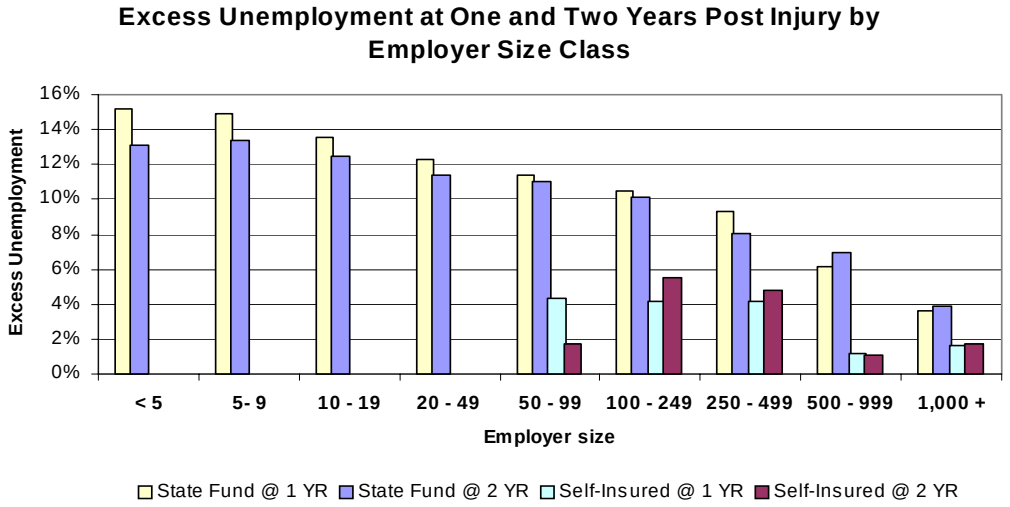
## Firm size

Firm size is another well-documented factor affecting return to work. There is a large difference in the excess unemployment levels of the state fund time loss group versus the self-insured. Some of that difference can be attributed to firm size. The table below shows the distribution of firms by employer size and insurance type.

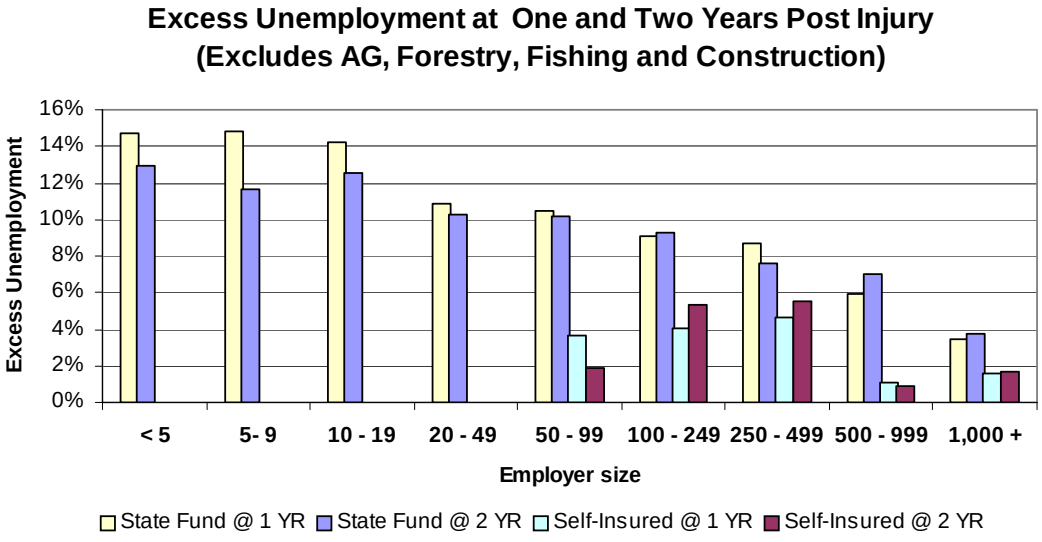
| State Fund Firm Distribution by Employer Size 4th Qrt 2002 - 3rd Qrt 2003 | | | | | |
|---|---|---|---|---|---|
| Employer Size | Accounts | Distribution of Accounts | Hours Worked | FTEs (2000 HRS) | Distribution of FTEs |
| <11 | 135,730 | 86.44% | 631,078,813 | 315,539 | 21.9% |
| 11-49 | 16,409 | 10.45% | 717,273,893 | 358,637 | 24.9% |
| 50-249 | 4,289 | 2.73% | 848,218,824 | 424,109 | 29.5% |
| 250-999 | 539 | 0.34% | 448,131,658 | 224,066 | 15.6% |
| 1000+ | 48 | 0.03% | 234,726,519 | 117,363 | 8.2% |
| Total | 157,015 | 100.00% | 2,879,429,707 | 1,439,715 | 100.0% |

| Self-Insured Firm Distribution by Employer Size 4th Qrt 2002 - 3rd Qrt 2003 | | | | | |
|---|---|---|---|---|---|
| Employer Size | Accounts | Distribution of Accounts | Hours Worked | FTEs (2000 HRS) | Distribution of FTEs |
| <11 | 4 | 1% | 25,315 | 13 | 0.0% |
| 11-49 | 12 | 3% | 770,021 | 385 | 0.1% |
| 50-249 | 75 | 20% | 21,097,245 | 10,549 | 1.8% |
| 250-999 | 165 | 43% | 178,242,135 | 89,121 | 15.5% |
| 1000+ | 124 | 33% | 946,811,559 | 473,406 | 82.6% |
| Total | 380 | 100% | 1,146,946,275 | 573,473 | 100.0% |

As the size of the firm increases the difference between self-insured and state fund excess unemployment grows smaller but is not completely eliminated. We do not show some self-insured size categories due to the very limited number of claims in those categories.




It would be easy to conclude that the reduction in excess unemployment that comes with increasing firm size might be due to the large number of small construction and agricultural firms. To test this, we omitted data for those employed in construction and agriculture; this did not change the trend. Implying that the trend of those employed in small firms incurring higher unemployment due to injury can not be attributed to a higher concentration of small firms in construction and agriculture.



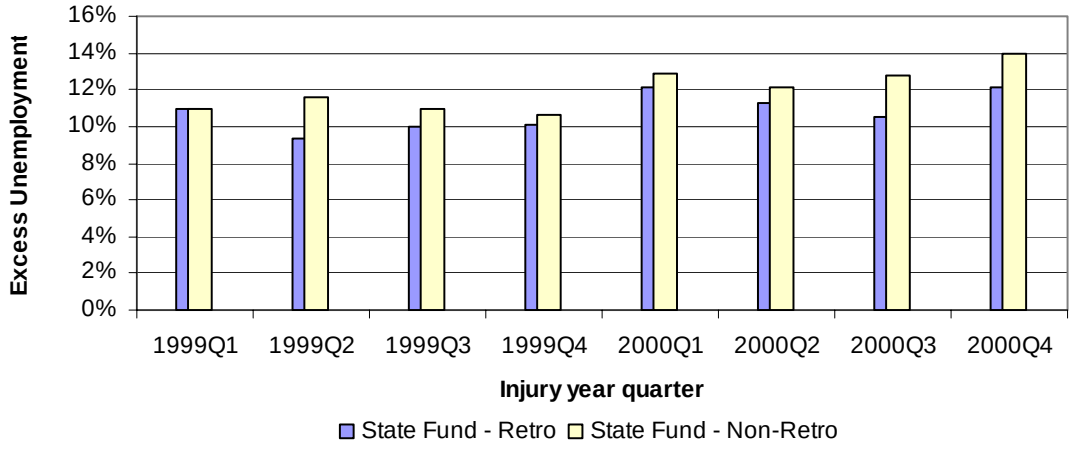
## Other Findings

### Retro and non-retro

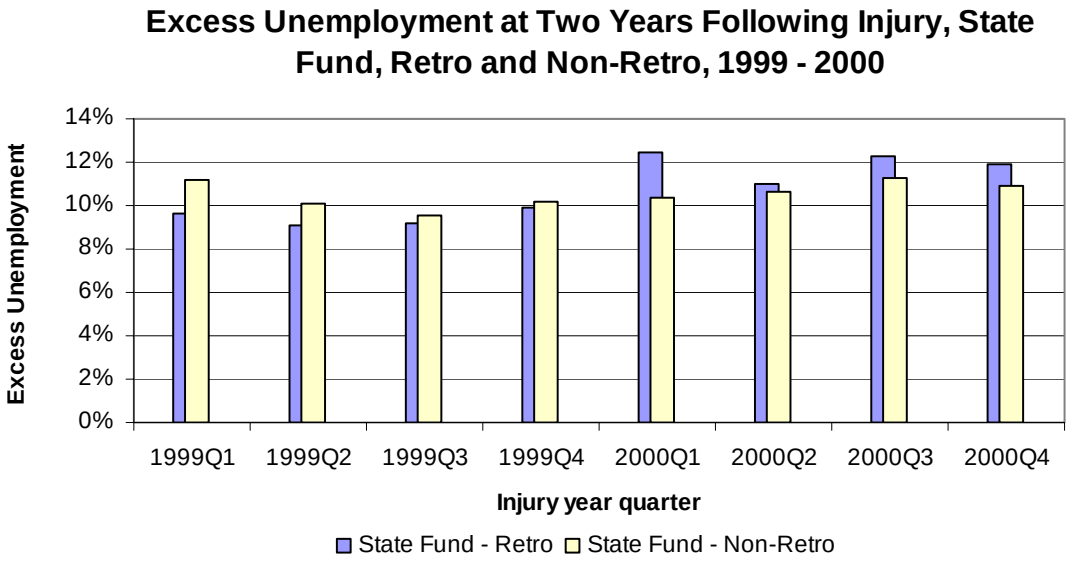
In this second report on return to work, we captured data that allows for a comparison of excess unemployment among workers covered by retrospective rating groups versus non-retro employers. Retrospective rating is an optional financial incentive program offered by the Department of Labor and Industries which rewards employers who minimize their industrial insurance losses. Qualifying employers can enroll on their own, or in group plans sponsored by various trade and professional organizations.

Excess unemployment at one year following injury is higher for the non-retro group.

**Excess Unemployment at One Year Following Injury, State Fund, Retro and Non-Retro, 1999 - 2000**



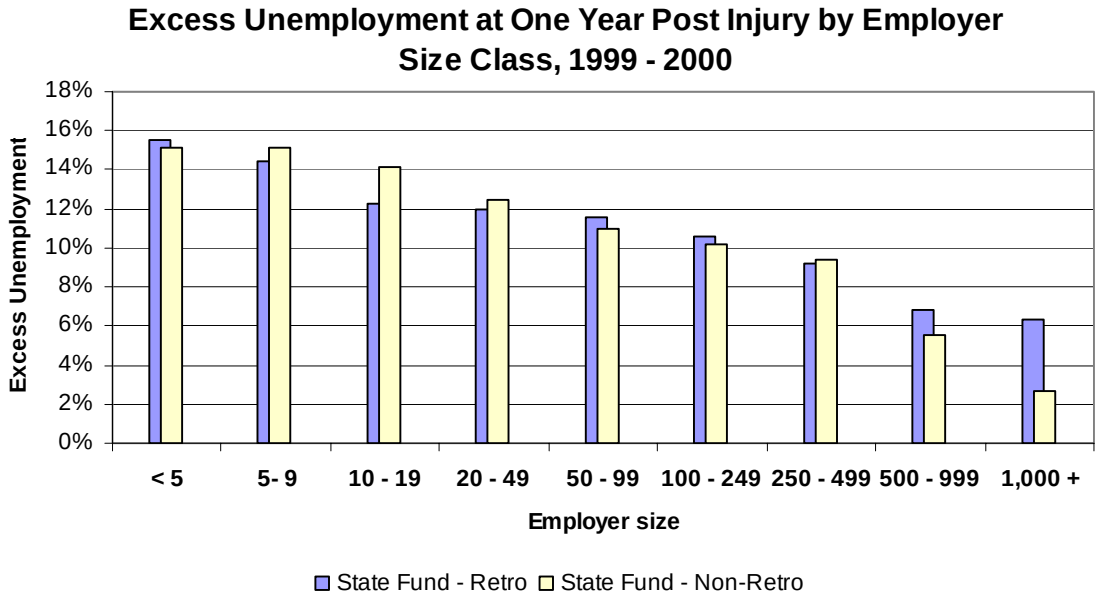

A similar trend is seen at the two-year mark, however, beginning with injury year 2000, the last half of our study period, this changed; the retrospective rating group had higher excess unemployment at two years after injury than the non-retro group. Both saw an increase over the eight quarter period.



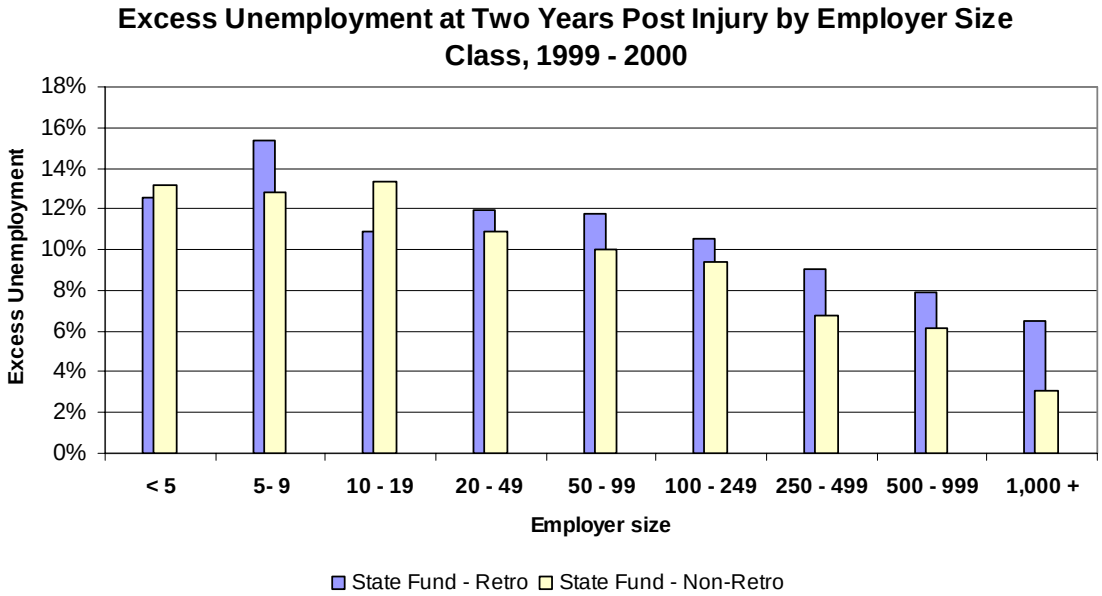

As discussed earlier, size of employer plays a role in return to work with those employed by larger employers often returning more quickly than those employed by small firms. The distribution of firms by size differs significantly between retro and non–retro firms. As shown in the table below, nearly 36% of non–retro claims occur in firms having 19 or fewer employees compared to 13.2% of retro claims. Given what we know, this may in part explain the higher excess unemployment of the non–retro group.

| | State Fund | | | | | |
|---|---|---|---|---|---|---|
| | Non Retro | | Retro | | Total | |
| Employer Size | No. of Cases | Distribution | No. of Cases | Distribution | No. of Cases | Distribution |
| < 5 | 16,824 | 11.9% | 2,222 | 1.8% | 19,046 | 7.1% |
| 5- 9 | 15,009 | 10.6% | 4,582 | 3.6% | 19,591 | 7.3% |
| 10 - 19 | 18,785 | 13.2% | 9,828 | 7.8% | 28,613 | 10.7% |
| 20 - 49 | 24,159 | 17.0% | 23,632 | 18.8% | 47,791 | 17.8% |
| 50 - 99 | 15,994 | 11.3% | 23,651 | 18.8% | 39,645 | 14.8% |
| 100 - 249 | 17,039 | 12.0% | 29,302 | 23.3% | 46,341 | 17.3% |
| 250 - 499 | 9,067 | 6.4% | 12,163 | 9.7% | 21,230 | 7.9% |
| 500 - 999 | 6,892 | 4.9% | 10,183 | 8.1% | 17,075 | 6.4% |
| 1,000 + | 11,131 | 7.8% | 7,483 | 5.9% | 18,614 | 6.9% |
| Unknown | 7,049 | 5.0% | 2,915 | 2.3% | 9,964 | 3.7% |
| Grand Total | 141,949 | 100.0% | 125,961 | 100.0% | 267,910 | 100.0% |

When we split out excess unemployment at one year by employer size class, we find that the differences in excess unemployment between retro and non-retro are minimal. The non-retro groups have lower excess unemployment in the larger size class; a pattern similar to what we saw earlier in this report when looking at excess unemployment by size class among the state fund and self-insured. The effects of retrospective rating on return to work are somewhat varied and appear to relate to the size of employer.




As a group, those injured while employed by retro employers had higher excess unemployment at the two-year mark across nearly all size class categories. Given the trend that we saw earlier with excess unemployment growing higher at the two-year mark for those injured while employed by retro participating firms, this is not surprising.



## Successful RTW as measured by return at (x) percent of pre-injury wages

How do injured workers do in terms of wage earnings following injury? The table below compares the share of workers in both the time loss and medical only groups at various wage levels (as share of pre-injury earnings). The distribution by earnings level is given for each group, time loss and medical only. In the state fund group, 7.9% more of the time loss group were earning <50% of their pre-injury wages than the medical only group.

| Earnings in Year Following Injury - (Percent of Pre-injury Earnings) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Group** | <50% | 50-59% | 60-69% | 70-79% | 80-89% | 90-99% | >=100% | No Earnings[1] |
| **State Fund** | Time Loss | 14.2% | 4.2% | 5.2% | 6.6% | 8.9% | 12.2% | 37.2% | 11.4% |
| | Medical Only | 6.3% | 2.9% | 4.0% | 5.8% | 8.8% | 14.7% | 51.8% | 5.8% |
| | | | | | | | | | |
| **Self-Insured** | Time Loss | 8.6% | 3.7% | 5.1% | 7.3% | 12.2% | 17.9% | 42.3% | 2.9% |
| | Medical Only | 5.0% | 2.3% | 3.5% | 5.8% | 10.3% | 19.0% | 51.2% | 2.9% |

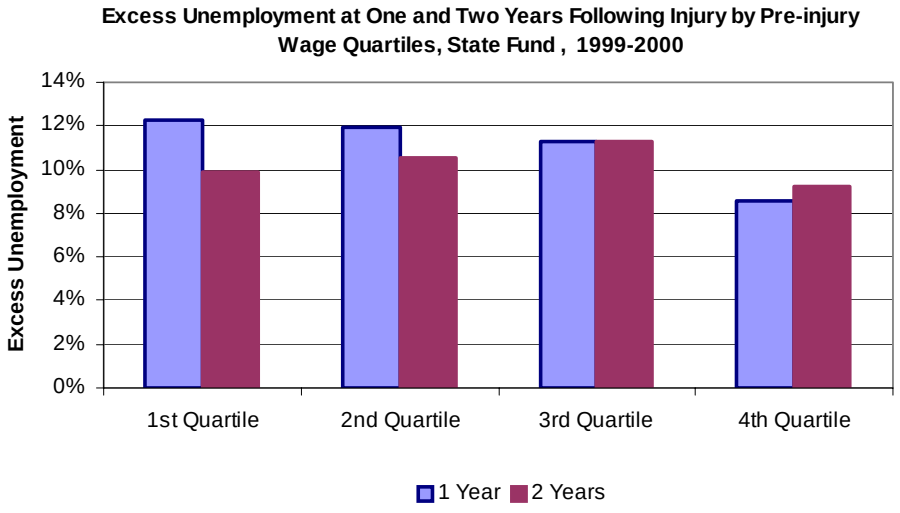
[1] No Earnings or earnings of less than 1 day at minimum wage in the year before or after injury.

| Earnings in Second Year Following Injury - (Percent of Pre-injury Earnings) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Group** | <50% | 50-59% | 60-69% | 70-79% | 80-89% | 90-99% | >=100% | No Earnings[1] |
| **State Fund** | Time Loss | 11.3% | 3.3% | 4.0% | 5.3% | 6.9% | 9.4% | 36.2% | 23.7% |
| | Medical Only | 7.9% | 2.8% | 3.7% | 5.1% | 7.4% | 10.9% | 47.2% | 14.9% |
| | | | | | | | | | |
| **Self-Insured** | Time Loss | 8.9% | 2.9% | 4.0% | 6.1% | 9.8% | 14.7% | 43.2% | 10.4% |
| | Medical Only | 7.0% | 2.4% | 3.5% | 5.5% | 8.9% | 14.4% | 48.9% | 9.5% |

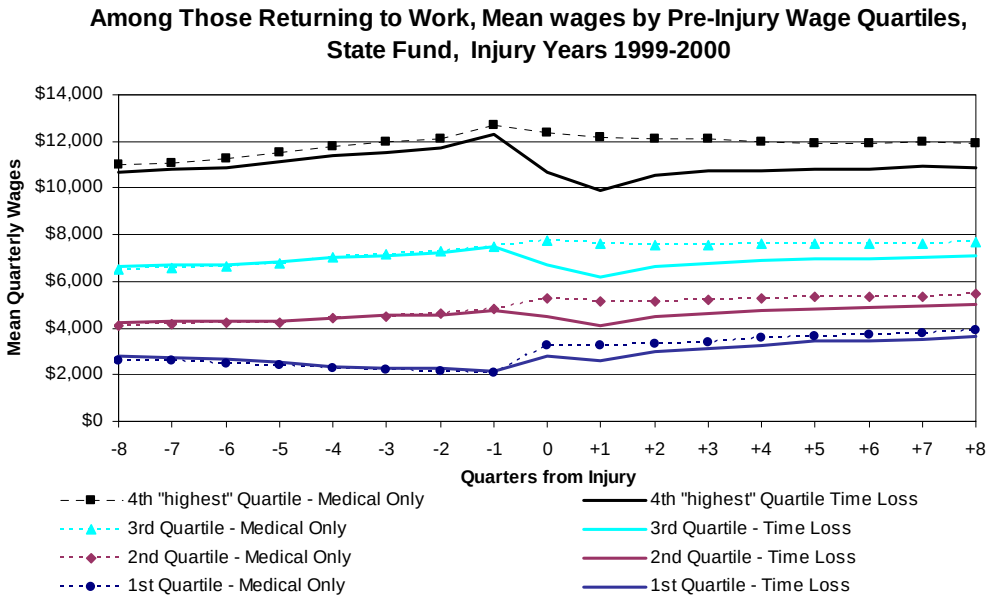
[1] No Earnings or earnings of less than 1 day at minimum wage in the year before and second year after injury.

## Differences in employment and earnings by pre-injury wage levels

The amount that a worker makes prior to the injury seems to affect employment at one and two years following injury: lower income employees have a greater risk of unemployment due to the injury.



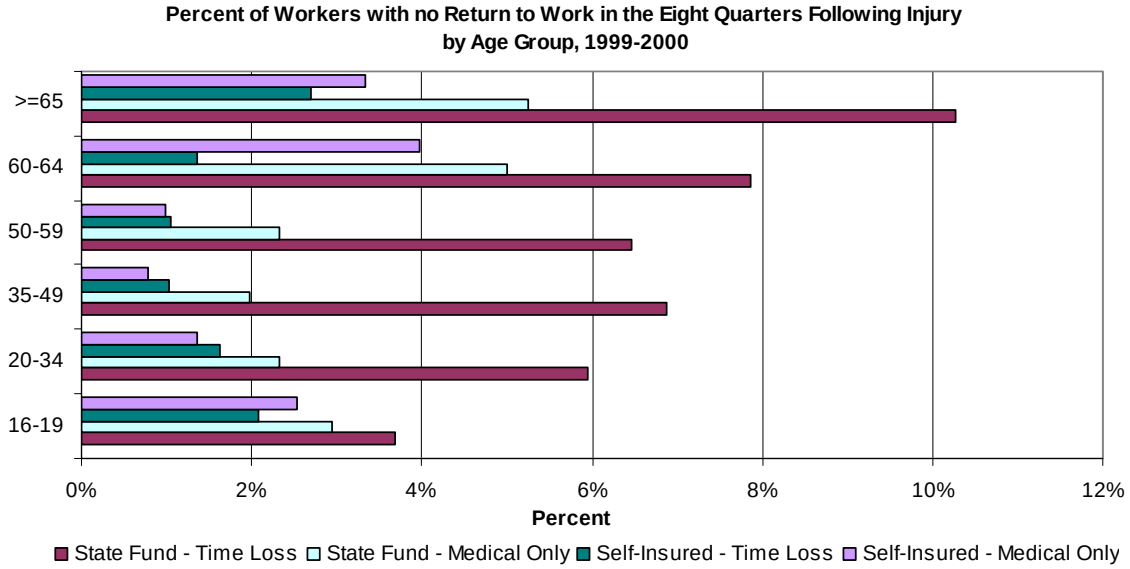
While those earning higher pre-injury wages are more likely to be employed following the injury, they lose more in terms of total earnings – workers in the lower wage quartiles suffer a larger loss in terms of percentage of pre-injury wages.



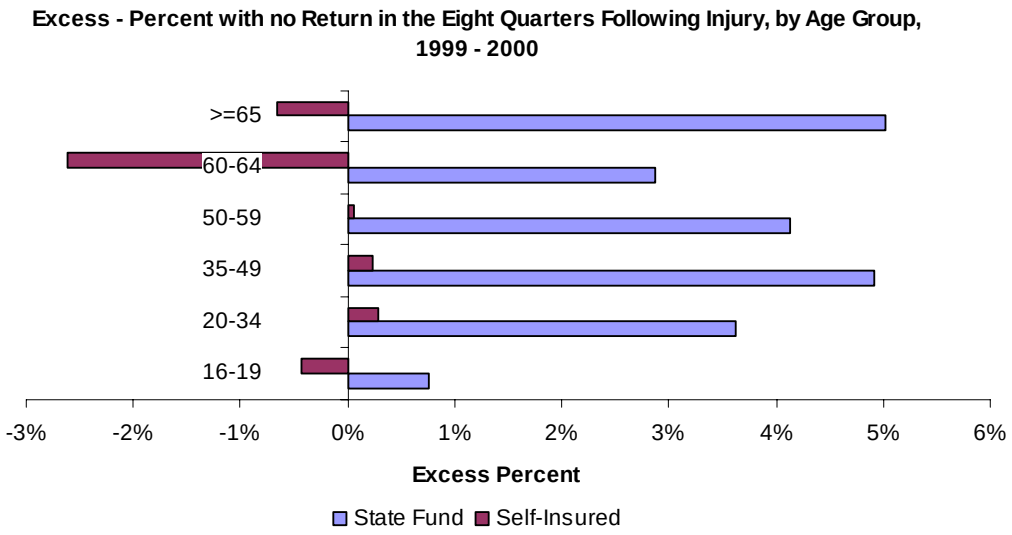

Note: Claims with no wages in the 4QRTS prior to injury are excluded. Quartiles are based on the average earnings in the 4 quarters prior to injury.

## Age group

In addition to earnings, it is thought that the age of the worker plays a role in whether or not they return to work.



Looking at the same data as above, but charting just the difference between the time loss and medical only groups helps to see the excess share of those with no return in the eight quarters following injury. The negative percentages mean that a higher share of the time loss group were found employed than the medical only – meaning that those with time loss claims did not suffer disproportionately to their counterparts that had more minor injuries. For example, those aged 60+ that had a time loss claim while working for a self-insured employer were more likely than their medical only counterparts to be found employed in the eight quarters following injury; this is not unexpected given the age category and the likelihood of retirement, disability due to other reasons, or even death.

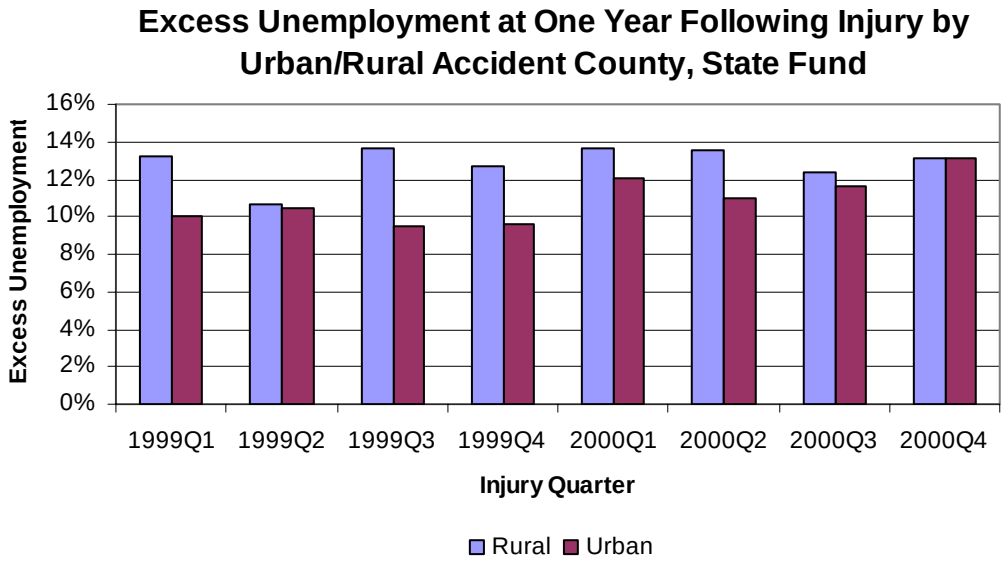


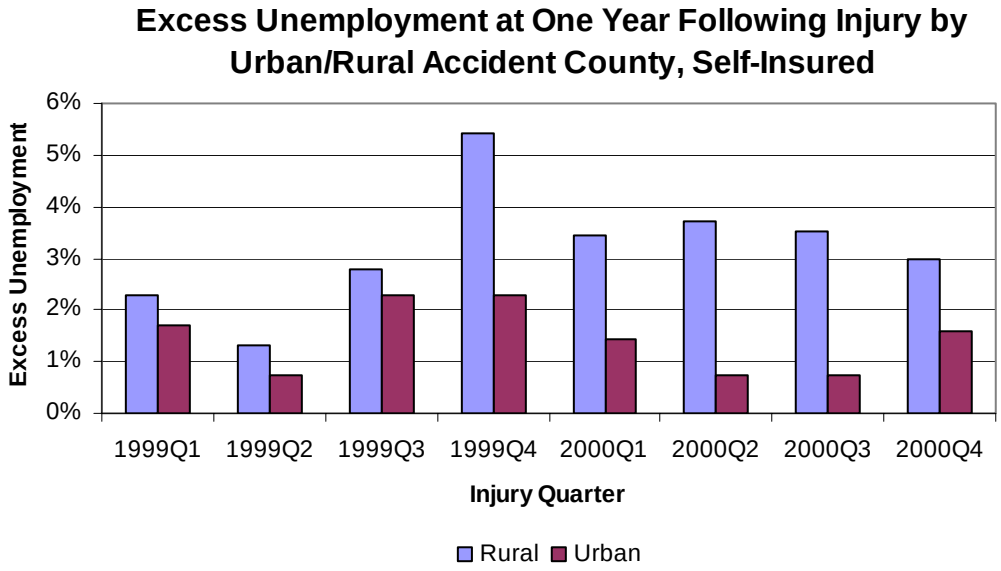

## RTW in urban/rural depressed/non-depressed areas

Urban areas often have better employment opportunities than rural areas. A higher share of those injured working for state fund firms are injured in rural areas.

| Insurance Type | Rural | Urban |
|---|---|---|
| State Fund | 29% | 71% |
| Self-Insured | 22% | 78% |
| Grand Total | 27% | 73% |
| Note: Based on accident county - excludes unknown | | |

Excess unemployment is higher for those injured in rural areas.



## Controlling for All the Variables

We have shown that a large number of factors appear to affect excess unemployment. Which of these variables are significant? Which are misleading, meaning they appear to matter but they really don't? For instance, does it really matter, in terms of return to work, that an accident happens in a rural area? Or is it that accidents in rural areas tend to occur in certain industries that are negatively correlated with return to work? Differences between the state fund and self-insured and time loss and medical only groups with respect to these factors make it necessary to try and control for some of the differences.

In an attempt to answer these questions, we analyzed data for workers ages 17 - 70 with injuries in 1999-2000 using logistic regression. Logistic regression is a method of regression that is appropriate when the response variable is binary, such as return at one year, yes or no. It can be used to model the relationship between the odds of an event or state occurring and a set of factors affecting those odds. It is preferable to ordinary least squares regression, which is meant to measure a response variable that is normally distributed. This method delivers a very useful tool known as an odds ratio. The odds ratio is defined as the ratio of the probability of something occurring (e.g. return to work) to the odds of it not occurring.

If the predicted odds ratio for a particular factor is less than 1, say .75, the variable has a negative impact on the probability of the dependent variable occurring; an observation possessing that characteristic is 25% less likely than one that does not possess that characteristic. If the odds ratio it is greater than one, say 2, an observation with that characteristic increases the probability of the dependent variable occurring. Below we show the odds of being employed at one year following injury for the self-insured time loss group, the self-insured medical only group, and the state fund medical only group. In this analysis, the state fund time loss group is used as the reference group, the point estimate is the odds in relation to the reference group.

There are two sections to the table. The first shows the odds ratio estimates from a model with no explanatory variables other than insurance/group type. Under this scenario, the odds ratio associated with a self-insured time loss claim is 2.67 meaning that a person employed with a self-insured employer at the time of injury has odds of being employed at one year following injury that are about 167 percent higher than their state fund counterpart. The second part of the table shows the results of a model that controls for gender, age, industry, employer size, pre-injury employment, and pre-injury wage; this lowers the estimate for the self-insured time loss group to 1.632 – or odds of being employed at one year following injury that are 63.2 percent higher than their state fund counterpart.

| Modeling probability of Return to Work at Year 1 Without Controlling for any Factors | | | |
|---|---|---|---|
| **Odds Ratio Estimates** | | | |
| **Effect** | **Point Estimate** | **95% Wald Confidence** | |
| Self - Insured Time Loss vs State - Fund Time Loss | 2.671* | 2.570 | 2.775 |
| Self-Insured Medical Only vs State Fund Time Loss | 3.249* | 3.153 | 3.347 |
| State Fund Medical Only vs State Fund Time Loss | 2.006* | 1.962 | 2.051 |
| **Modeling probability of Return to Work at Year 1 Controlling for, Gender, Age, Industry, Employer Size, Pre-injury Employment, and Pre-injury Wage** | | | |
| Self - Insured Time Loss vs State - Fund Time Loss | 1.632* | 1.559 | 1.708 |
| Self-Insured Medical Only vs State Fund Time Loss | 2.085* | 2.006 | 2.166 |
| State Fund Medical Only vs State Fund Time Loss | 1.995* | 1.949 | 2.043 |

* Significant at P <0.05

Including the medical and time loss claims from the state fund and self insured in one model and controlling for insurance and case types helps us to answer the question:

> After controlling for some of the key factors known to affect employment, including industry and firm size, which group has higher odds of returning to work, and how much higher are those odds?

While this model, presented in full in Appendix B, is helpful in obtaining the estimates for the above parameters, analyzing the affects of all of the independent variables using this model would tell us about their influence on return to work in general, not return to work among the injured worker population which is of primary interest. For this, we turn to a modified model, and limit our analysis to workers employed by state fund firms. This is primarily because of the availability of more comprehensive data on state fund claims including data on marital status, nature of injury, and the number of dependents (time loss only), in addition to the characteristics used in the above model.

### Modeling the state fund data, time loss and medical only

The same logistic regression model was performed on state fund time loss and medical only claims (Appendix C). In this report we have used the medical only group to help isolate the excess unemployment due to injury, using identical models is somewhat analogous to that: looking at the same model for time loss and medical only cases helps us to see the odds of workers with time loss injuries being employed at one year following injury versus those who had minor injuries which were assumed to not affect their odds of being employed. If we looked only at the time loss group, the odds on a particular characteristic could be very high, but may not necessarily be attributable to the injury.

In the following table is an example from the model. The estimate for female versus male is not significant among the time loss group but among the medical only group, being female increases the probability of being employed at one year post injury by about 11%, implying that a female's odds of being employed at one year following injury are hampered more than those of a male. Similarly, being married does not affect the odds of employment at one year for a member of the time loss group in this particular model, but being married is associated with increased odds of being employed by about 8 % in the medical only group.

| **State Fund - Time Loss and Medical Only** | | | | | | |
|---|---|---|---|---|---|---|
| **Modeling probability of Return to Work at Year 1** | | | | | | |
| **Odds Ratio Estimates** | | | | | | |
| | **Time Loss** | | | **Medical Only** | | |
| Effect | Point Estimate | 95% Wald Confidence Limits | | Point Estimate | 95% Wald Confidence Limits | |
| Female vs Male | 1.017 | 0.969 | 1.068 | 1.109* | 1.076 | 1.144 |
| Married vs Single | 1.034 | 0.993 | 1.077 | 1.080* | 1.051 | 1.110 |
| Injury Age <35 vs 55+ | 1.494* | 1.384 | 1.613 | 1.373* | 1.299 | 1.451 |
| Injury Age 35-54 vs 55+ | 1.190* | 1.106 | 1.281 | 1.382* | 1.308 | 1.461 |

* Significant at P <0.05

Other factors found to be significant for the time loss group in being employed at one year following injury are:

- Age <35: odds 49% higher than those age 55+ (note lower odds for those in the medical only group).
- Employment in construction: odds about 25% lower than if employed in wholesale.
- Employment in the public sector: odds about 100% higher than if employed in wholesale.
- Employer's firm size 10-19: odds 13 % higher than firm size < 5.
- Employer's firm size 1000+: odds 81% higher than firm size < 5.
- Employed in 1 out of 8 quarters prior to injury: odds about 24 % higher than if employed 0 out of 8 quarters prior to injury.
- Employed 8 out of 8 quarters prior to injury: odds about 270% higher than if employed 0 out of 8 quarters prior to injury.
- Pre-injury quarterly earnings in highest quartile: odds about 115 % higher than if in first quartile.

**Modeling state fund time loss and including nature of injury and dependent quantity information.**

The models above exclude two important independent variables: nature of injury and number of dependents. The presumption is that the nature of injury can help predict who will most likely be employed following injury. The nature of injury variable was not included in the previous model as it is our presumption that it

does not influence the employment of the medical only group at one year following injury.

The number of dependents is of interest because it can influence the amount of compensation that one receives; a high level of compensation (relative to pre-injury earnings) is thought by some to discourage return to work. There is also speculation that factors affiliated with having dependents, such as concerns over child care, which are unrelated to either the injury or the level of compensation, may influence employment following injury. The state fund time loss group is the only group for which we have complete data on the number of dependents that an injured worker has.

Factors found to be significant for the state fund time loss group in being employed at one year following injury when controlling for the additional independent variables nature of injury and number of dependents are:

- Being female: odds of employment at one year 8% higher than males; nearly 10% higher at two years.
- Being married: odds of employment at one year 9% higher; about8 % at two years.
- Employed in construction: odds about 25% lower than if employed in wholesale.
- Employed in the public sector: odds about 105% higher than if employed in wholesale.
- Hernia: odds about 96% higher than if occupational disease.
- Fracture: odds about 44% higher than if occupational disease.
- Dependents: Having no dependents increased the odds of being employed at one year following injury by about 22%.

See the complete list of significant factors in Appendix D.

## Conclusion

In this report we find that size, industry, age, gender, marital status, pre-injury employment patterns, earnings level and nature of injury affect return to work rates. It is important to understand these factors in order to be able to explain differences in return to work rates. It is also important to consider how these factors affect the non-injured population as well.

When all factors are included in a logistic regression model, we find that some factors are more important than others in determining whether a person will be employed at one and two years (Y1, Y2) following injury. When controlling for: gender, marital status, age, industry, firm size, pre-injury employment, pre-injury earnings level, dependent quantity and nature of injury, we find the following positive and negative factors:

**Positive:**

Female (Y1, Y2)
Married (Y1, Y2)
Lower injury age (Y1, Y2)
Public sector employment (Y1, Y2)
Larger firm size (Y1, Y2)
Stable pre-injury employment (Y1, Y2)
Higher pre-injury earnings (Y1, Y2)
Having no dependents (Y1)

**Negative factors:**

Single (Y1, Y2)
Older age (Y1, Y2)
Construction employment (Y1, Y2)
Manufacturing employment (Y1, Y2)

This report builds upon the previous return to work report by providing analysis of the significance of factors affecting return to work. It is a next step in understanding how policies and external factors may affect return to work.

It is also important to keep in mind some of the caveats to the analysis as discussed in this report.

- Limitations of using the medical only group as a comparison group – can't assume that this group is an exact proxy for the never injured.
- Difficulties in matching between the Labor and Industries and Employment Security administrative data bases.
- Data limitations for the self-insured and medical only claims.
- Additional work is needed to adequately control for differences in the risk of work done between groups through means other than controlling for industry. As risky work becomes more prone to being contracted out, this will become increasingly important. Differences in risk exposure may also be in part responsible for the gender differences seen in the models presented in this report.
- Lack of available data on additional factors such as: educational attainment, overall health status, access to health insurance, psycho-social status, individual motivation, employee/employer relationship, job tenure, and injury severity.

Also missing from this analysis is an examination of the administrative factors that may cause delayed return to work and whether there are claim management practices that are particularly successful in getting workers back to work. Many

performance measurement tools are still in development, future studies may allow for incorporation of those measures with return to work studies. This would provide even further useful information to aid decision-makers and improve understanding of return to work.

The Department has placed a high priority on early intervention and return to work. In this report we have identified factors that elevate the risk of being unemployed at one and two years post injury. The factors identified could be used to help target resources to those at greatest risk. Additional knowledge could help to further focus the Department's intervention efforts on the groups with the most need. To that end, we urge the continued support of research on return to work and factors affecting sustained time loss.

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# Appendix A

| | State Fund Time Loss | State Fund Medical Only | Self-Insured Time Loss | Self-Insured Medical Only | Grand Total |
|---|---|---|---|---|---|
| ***Total Claims*** | 58,750 | 209,160 | 32,312 | 78,009 | 378,231 |
| ***Total Claims by Quarter*** | | | | | |
| 19991 | 7,204 | 24,658 | 4,201 | 9,549 | 45,612 |
| 19992 | 7,494 | 26,470 | 4,221 | 9,808 | 47,993 |
| 19993 | 8,090 | 29,566 | 4,214 | 9,987 | 51,857 |
| 19994 | 7,233 | 25,792 | 4,038 | 9,992 | 47,055 |
| 20001 | 7,153 | 24,948 | 3,983 | 9,809 | 45,893 |
| 20002 | 7,234 | 26,424 | 3,905 | 9,696 | 47,259 |
| 20003 | 7,551 | 27,604 | 3,982 | 9,660 | 48,797 |
| 20004 | 6,791 | 23,698 | 3,768 | 9,508 | 43,765 |
| ***Return to Work at Year 1*** | | | | | |
| No | 28.1 | 16.6 | 12.5 | 10.6 | |
| Yes | 71.9 | 83.4 | 87.5 | 89.4 | |
| ***Return to Work at Year 2*** | | | | | |
| No | 35.2 | 24.5 | 19.0 | 17.0 | |
| Yes | 64.8 | 75.5 | 81.0 | 83.0 | |
| ***Gender*** | | | | | |
| F | 30.3 | 28.4 | 42.5 | 43.9 | |
| M | 69.7 | 71.6 | 57.5 | 56.1 | |
| ***Marital Status*** | | | | | |
| M | 48.8 | 42.5 | 55.9 | n.a.[1] | |
| S | 51.2 | 57.6 | 43.6 | n.a. | |
| ***Age Group*** | | | | | |
| 16-19 | 3.4 | 6.5 | 2.2 | 3.8 | |
| 20-34 | 36.2 | 45.7 | 28.2 | 33.6 | |
| 35-49 | 43.9 | 35.3 | 47.4 | 42.8 | |
| 50-59 | 13.3 | 10.1 | 18.6 | 16.7 | |
| 60-64 | 2.4 | 1.9 | 3.0 | 2.6 | |
| >=65 | 0.7 | 0.6 | 0.6 | 0.5 | |
| ***Dependent Quality*** | | | | | |
| 0 | 59.6 | | | | |
| 1 | 17.3 | | | | |
| 2 | 14.5 | | | | |
| 3 | 5.9 | | | | |
| >=4 | 2.7 | | | | |

| | State Fund Time loss | State Fund Medical Only | Self-insured Time Loss | Self-insured Medical Only |
|---|---|---|---|---|
| ***Major Industry Division (SIC)*** | | | | |
| Agriculture, Forestry & Fishing | 5.5 | 5.3 | 0.9 | 1.0 |
| Construction & Mining | 20.2 | 17.7 | 2.0 | 2.4 |
| Finance, Insurance & Real Estate | 2.2 | 2.3 | 0.8 | 1.1 |
| Manufacturing | 13.7 | 15.0 | 25.2 | 30.2 |
| Public | 4.1 | 3.7 | 12.0 | 9.3 |
| Retail | 15.9 | 19.2 | 15.8 | 18.9 |
| Services | 23.2 | 23.2 | 23.9 | 24.9 |
| Transportation, Communication & Public Utilities | 6.9 | 4.9 | 14.4 | 9.1 |
| Wholesale | 7.2 | 7.5 | 4.5 | 2.5 |
| Unknown | 1.2 | 1.2 | 0.5 | 0.7 |
| ***Firm Size*** | | | | |
| <5 | 8.7 | 6.7 | 0.1 | 0.1 |
| 5-9 | 7.9 | 7.2 | 0.1 | 0.1 |
| 10-19 | 11.1 | 10.6 | 0.1 | 0.1 |
| 20-49 | 17.4 | 18.0 | 0.5 | 0.5 |
| 50-99 | 13.8 | 15.0 | 1.2 | 1.3 |
| 100-249 | 15.7 | 17.7 | 5.5 | 5.9 |
| 250-499 | 7.7 | 8.0 | 7.8 | 8.5 |
| 500-999 | 6.4 | 6.4 | 14.2 | 13.8 |
| 1000+ | 7.2 | 6.9 | 69.2 | 68.4 |
| Unknown | 4.1 | 3.6 | 1.3 | 1.2 |
| ***Distressed County*** | | | | |
| Distressed | 23.0 | 23.1 | 16.5 | 19.9 |
| Not Distressed | 75.6 | 75.9 | 81.8 | 78.5 |
| Unknown/Out of State | 1.4 | 1.0 | 1.7 | 1.7 |
| ***Urban/Rural*** | | | | |
| Rural | 27.8 | 28.4 | 18.6 | 22.7 |
| Urban | 70.8 | 70.7 | 79.7 | 75.7 |
| Unknown/Out of State | 1.4 | 1.0 | 1.7 | 1.7 |
| ***Nature of Injury*** | | | | |
| All other | 16.1 | 9.4 | 36.0 | n.a. |
| Burns | 1.2 | 2.4 | 0.5 | n.a. |
| Contusion | 7.3 | 12.6 | 3.7 | n.a. |
| Cuts | 6.0 | 25.3 | 2.2 | n.a. |
| Fracture | 8.7 | 2.6 | 2.7 | n.a. |
| Hernia | 2.6 | 0.2 | 1.1 | n.a. |
| Multiple Injuries | 2.2 | 1.2 | 1.6 | n.a. |
| No Physical Injury | 0.1 | 0.6 | 0.1 | n.a. |
| Occupational Disease | 8.4 | 6.9 | 5.6 | n.a. |
| Scratches | 0.6 | 7.9 | 0.3 | n.a. |
| Sprain | 46.7 | 30.8 | 31.2 | n.a. |
| Unknown | 0.2 | 0.1 | 15.0 | n.a. |

[1] Data not available.

## Appendix B: All Insurance Types, Medical and Time Loss

**State Fund and Self-Insured, Medical Only and Time Loss**

**Modeling the Probability of Return to Work at:**

| | Year 1 | | | Year 2 | | |
|---|---|---|---|---|---|---|
| | Odds Ratio Estimates | | | | | |
| Effect | Point Estimate | 95% Wald Confidence | | Point Estimate | 95% Wald Confidence | |
| Female vs Male | 1.075* | 1.052 | 1.100 | 1.064* | 1.043 | 1.084 |
| Self - Insured Time Loss vs State - Fund Time Loss | 1.632* | 1.559 | 1.708 | 1.484* | 1.427 | 1.544 |
| Self-Insured Medical Only vs State Fund Time Loss | 2.085* | 2.006 | 2.166 | 1.785* | 1.727 | 1.845 |
| State Fund Medical Only vs State Fund Time Loss | 1.995* | 1.949 | 2.043 | 1.669* | 1.634 | 1.705 |
| Injury Age <35 vs 55+ | 1.499* | 1.445 | 1.555 | 1.796* | 1.741 | 1.852 |
| Injury Age 35-54 vs 55+ | 1.499* | 1.446 | 1.555 | 1.815* | 1.761 | 1.871 |
| Agriculture, Forestry & Fishing vs Wholesale | 0.913* | 0.863 | 0.965 | 0.960 | 0.913 | 1.009 |
| Construction & Mining vs Wholesale | 0.781* | 0.746 | 0.817 | 0.819* | 0.787 | 0.851 |
| Finance, Insurance and Real Estate vs Wholesale | 0.975 | 0.903 | 1.052 | 0.983 | 0.920 | 1.050 |
| Manufacturing vs Wholesale | 0.822* | 0.787 | 0.859 | 0.817* | 0.786 | 0.848 |
| Public vs Wholesale | 1.747* | 1.627 | 1.876 | 1.784* | 1.684 | 1.891 |
| Retail vs Wholesale | 1.036 | 0.991 | 1.082 | 1.051* | 1.012 | 1.092 |
| Services vs Wholesale | 1.041 | 0.997 | 1.087 | 1.070* | 1.031 | 1.111 |
| Transportation, Com & Public Utilities vs Wholesale | 1.074* | 1.017 | 1.134 | 1.049* | 1.002 | 1.099 |
| Firm Size 5 -9 vs <5 | 1.076* | 1.024 | 1.131 | 1.011 | 0.966 | 1.058 |
| Firm Size 10-19 vs <5 | 1.132* | 1.081 | 1.185 | 1.042 | 0.999 | 1.087 |
| Firm Size 20-49 vs <5 | 1.216* | 1.166 | 1.269 | 1.112* | 1.070 | 1.156 |
| Firm Size 50-99 vs <5 | 1.296* | 1.239 | 1.355 | 1.159* | 1.113 | 1.207 |
| Firm Size 100-249 vs <5 | 1.298* | 1.242 | 1.356 | 1.179* | 1.133 | 1.226 |
| Firm Size 250-499 vs <5 | 1.351* | 1.285 | 1.421 | 1.216* | 1.163 | 1.271 |
| Firm Size 500 -999 vs <5 | 1.307* | 1.242 | 1.375 | 1.133* | 1.083 | 1.185 |
| Firm Size1,000+ vs <5 | 1.396* | 1.329 | 1.466 | 1.245* | 1.192 | 1.301 |
| No of QRTS Employed Prior to Injury 1 vs 0 | 1.331* | 1.247 | 1.420 | 1.353* | 1.268 | 1.443 |
| No of QRTS Employed Prior to Injury 2 vs 0 | 1.458* | 1.366 | 1.555 | 1.466* | 1.375 | 1.563 |
| No of QRTS Employed Prior to Injury 3 vs 0 | 1.696* | 1.590 | 1.809 | 1.736* | 1.630 | 1.849 |
| No of QRTS Employed Prior to Injury 4 vs 0 | 1.901* | 1.785 | 2.025 | 1.885* | 1.772 | 2.006 |
| No of QRTS Employed Prior to Injury 5 vs 0 | 2.145* | 2.016 | 2.282 | 2.163* | 2.035 | 2.298 |
| No of QRTS Employed Prior to Injury 6 vs 0 | 2.391* | 2.251 | 2.539 | 2.387* | 2.250 | 2.531 |
| No of QRTS Employed Prior to Injury 7 vs 0 | 3.038* | 2.866 | 3.220 | 3.054* | 2.884 | 3.233 |
| No of QRTS Employed Prior to Injury 8 vs 0 | 4.668* | 4.415 | 4.935 | 4.567* | 4.323 | 4.824 |
| Highest Quarile Wages VS First | 2.428* | 2.345 | 2.514 | 2.149* | 2.087 | 2.213 |
| Third Quartile Wages VS First | 1.836* | 1.783 | 1.891 | 1.674* | 1.631 | 1.717 |
| Second Quartile Wages VS First | 1.447* | 1.411 | 1.485 | 1.340* | 1.310 | 1.371 |

* Significant at P <0.05

# Appendix C: State Fund, Time Loss and Medical Only

| State Fund - Time Loss and Medical Only | | | | | | |
|---|---|---|---|---|---|---|
| **Modeling probability of Return to Work at Year 1** | | | | | | |
| **Odds Ratio Estimates** | | | | | | |
| | **Time Loss** | | | **Medical Only** | | |
| Effect | Point Estimate | 95% Wald Confidence Limits | | Point Estimate | 95% Wald Confidence Limits | |
| Female vs Male | 1.017 | 0.969 | 1.068 | 1.109* | 1.076 | 1.144 |
| Married vs Single | 1.034 | 0.993 | 1.077 | 1.080* | 1.051 | 1.110 |
| Injury Age <35 vs 55+ | 1.494* | 1.384 | 1.613 | 1.373* | 1.299 | 1.451 |
| Injury Age 35-54 vs 55+ | 1.190* | 1.106 | 1.281 | 1.382* | 1.308 | 1.461 |
| Agriculture, Forestry & Fishing vs Wholesale | 0.979 | 0.878 | 1.091 | 0.879* | 0.820 | 0.942 |
| Construction & Mining vs Wholesale | 0.750* | 0.688 | 0.818 | 0.817* | 0.771 | 0.865 |
| Finance, Insurance and Real Estate vs Wholesale | 0.904 | 0.780 | 1.048 | 0.990 | 0.898 | 1.090 |
| Manufacturing vs Wholesale | 0.934 | 0.854 | 1.021 | 0.902* | 0.851 | 0.956 |
| Public vs Wholesale | 2.017* | 1.716 | 2.372 | 1.752* | 1.567 | 1.958 |
| Retail vs Wholesale | 1.080 | 0.989 | 1.181 | 1.042 | 0.984 | 1.102 |
| Services vs Wholesale | 1.013 | 0.930 | 1.104 | 0.980 | 0.927 | 1.036 |
| Transportation, Com & Public Utilities vs Wholesale | 0.996 | 0.896 | 1.106 | 1.004 | 0.929 | 1.084 |
| Firm Size 5 -9 vs <5 | 1.030 | 0.944 | 1.124 | 1.095* | 1.030 | 1.164 |
| Firm Size 10-19 vs <5 | 1.128* | 1.040 | 1.224 | 1.128* | 1.066 | 1.193 |
| Firm Size 20-49 vs <5 | 1.221* | 1.132 | 1.317 | 1.203* | 1.142 | 1.268 |
| Firm Size 50-99 vs <5 | 1.250* | 1.153 | 1.355 | 1.297* | 1.227 | 1.370 |
| Firm Size 100-249 vs <5 | 1.343* | 1.239 | 1.455 | 1.279* | 1.212 | 1.349 |
| Firm Size 250-499 vs <5 | 1.430* | 1.298 | 1.576 | 1.355* | 1.270 | 1.445 |
| Firm Size 500 -999 vs <5 | 1.549* | 1.394 | 1.721 | 1.258* | 1.176 | 1.347 |
| Firm Size1,000+ vs <5 | 1.810* | 1.627 | 2.014 | 1.229* | 1.148 | 1.316 |
| No of QRTS Employed Prior to Injury 1 vs 0 | 1.244* | 1.076 | 1.439 | 1.365* | 1.259 | 1.480 |
| No of QRTS Employed Prior to Injury 2 vs 0 | 1.241* | 1.074 | 1.433 | 1.515* | 1.397 | 1.643 |
| No of QRTS Employed Prior to Injury 3 vs 0 | 1.516* | 1.314 | 1.749 | 1.747* | 1.612 | 1.893 |
| No of QRTS Employed Prior to Injury 4 vs 0 | 1.632* | 1.420 | 1.875 | 1.971* | 1.822 | 2.133 |
| No of QRTS Employed Prior to Injury 5 vs 0 | 1.859* | 1.622 | 2.130 | 2.238* | 2.071 | 2.419 |
| No of QRTS Employed Prior to Injury 6 vs 0 | 1.991* | 1.745 | 2.271 | 2.577* | 2.390 | 2.779 |
| No of QRTS Employed Prior to Injury 7 vs 0 | 2.503* | 2.202 | 2.845 | 3.261* | 3.032 | 3.508 |
| No of QRTS Employed Prior to Injury 8 vs 0 | 3.698* | 3.268 | 4.185 | 4.919* | 4.589 | 5.273 |
| Highest Quartile Wages VS First | 2.155* | 1.999 | 2.323 | 2.458* | 2.339 | 2.582 |
| Third Quartile Wages VS First | 1.637* | 1.540 | 1.740 | 1.952* | 1.875 | 2.032 |
| Second Quartile Wages VS First | 1.355* | 1.285 | 1.428 | 1.455* | 1.406 | 1.504 |

* Significant at P <0.05

# Appendix D: State Fund, Detailed Analysis of Time Loss Cases

**State Fund, Detailed Analysis of Time Loss Cases**
**Modeling the Probability of Return to Work at:**

| | Year 1 | | | Year 2 | | |
|---|---|---|---|---|---|---|
| | Odds Ratio Estimates | | | | | |
| **Effect** | **Point Estimate** | **95% Wald Confidence Limits** | | **Point Estimate** | **95% Wald Confidence Limits** | |
| Female vs Male | 1.078* | 1.026 | 1.133 | 1.097* | 1.048 | 1.149 |
| CLM_MARTL_STAT_CODE M vs S | 1.087* | 1.041 | 1.134 | 1.076* | 1.034 | 1.120 |
| Injury Age <35 vs 55+ | 1.576* | 1.456 | 1.705 | 1.839* | 1.710 | 1.978 |
| Injury Age 35-54 vs 55+ | 1.267* | 1.175 | 1.366 | 1.525* | 1.423 | 1.634 |
| Agriculture, Forestry & Fishing vs Wholesale | 0.968 | 0.868 | 1.079 | 1.020 | 0.920 | 1.131 |
| Construction & Mining vs Wholesale | 0.750* | 0.688 | 0.818 | 0.766* | 0.707 | 0.831 |
| Finance, Insurance and Real Estate vs Wholesale | 0.899 | 0.775 | 1.042 | 0.892 | 0.776 | 1.024 |
| Manufacturing vs Wholesale | 0.914* | 0.836 | 1.000 | 0.874* | 0.804 | 0.950 |
| Public vs Wholesale | 2.051* | 1.744 | 2.412 | 1.863* | 1.623 | 2.137 |
| Retail vs Wholesale | 1.059 | 0.969 | 1.158 | 1.072 | 0.987 | 1.165 |
| Services vs Wholesale | 1.019 | 0.935 | 1.111 | 1.018 | 0.940 | 1.103 |
| Transportation, Com & Public Utilities vs Wholesale | 1.008 | 0.907 | 1.120 | 0.988 | 0.896 | 1.089 |
| Firm Size 5 -9 vs <5 | 1.046 | 0.959 | 1.142 | 0.983 | 0.903 | 1.070 |
| Firm Size 10-19 vs <5 | 1.143* | 1.053 | 1.240 | 1.042 | 0.963 | 1.127 |
| Firm Size 20-49 vs <5 | 1.245* | 1.154 | 1.343 | 1.130* | 1.050 | 1.215 |
| Firm Size 50-99 vs <5 | 1.277* | 1.177 | 1.385 | 1.126* | 1.042 | 1.217 |
| Firm Size 100-249 vs <5 | 1.378* | 1.271 | 1.494 | 1.219* | 1.129 | 1.317 |
| Firm Size 250-499 vs <5 | 1.467* | 1.331 | 1.617 | 1.328* | 1.211 | 1.456 |
| Firm Size 500 -999 vs <5 | 1.590* | 1.430 | 1.767 | 1.286* | 1.165 | 1.418 |
| Firm Size1,000+ vs <5 | 1.841* | 1.654 | 2.049 | 1.512* | 1.369 | 1.668 |
| No of QRTS Employed Prior to Injury 1 vs 0 | 1.269* | 1.097 | 1.468 | 1.273* | 1.096 | 1.479 |
| No of QRTS Employed Prior to Injury 2 vs 0 | 1.260* | 1.090 | 1.457 | 1.316* | 1.134 | 1.526 |
| No of QRTS Employed Prior to Injury 3 vs 0 | 1.558* | 1.350 | 1.799 | 1.581* | 1.366 | 1.830 |
| No of QRTS Employed Prior to Injury 4 vs 0 | 1.674* | 1.456 | 1.925 | 1.656* | 1.437 | 1.909 |
| No of QRTS Employed Prior to Injury 5 vs 0 | 1.918* | 1.673 | 2.199 | 1.918* | 1.669 | 2.203 |
| No of QRTS Employed Prior to Injury 6 vs 0 | 2.062* | 1.806 | 2.354 | 2.131* | 1.862 | 2.439 |
| No of QRTS Employed Prior to Injury 7 vs 0 | 2.588* | 2.275 | 2.943 | 2.781* | 2.440 | 3.170 |
| No of QRTS Employed Prior to Injury 8 vs 0 | 3.820* | 3.374 | 4.326 | 3.919* | 3.452 | 4.449 |
| Highest Quarile Wages VS First | 2.216* | 2.055 | 2.390 | 2.008* | 1.874 | 2.152 |
| Third Quartile Wages VS First | 1.665* | 1.566 | 1.770 | 1.545* | 1.459 | 1.636 |
| Second Quartile Wages VS First | 1.362* | 1.292 | 1.436 | 1.313* | 1.248 | 1.380 |
| Dependent Quantity 0 vs >=4 | 1.215* | 1.078 | 1.368 | 1.114 | 0.995 | 1.247 |
| Dependent Quantity 1 vs >=4 | 1.108 | 0.978 | 1.254 | 1.105 | 0.982 | 1.244 |
| Dependent Quantity 2 vs >=4 | 1.070 | 0.944 | 1.213 | 1.084 | 0.962 | 1.221 |
| Dependent Quantity 3 vs >=4 | 1.036 | 0.902 | 1.190 | 1.079 | 0.945 | 1.232 |
| nature_mdlF All other vs Occ disea | 0.998 | 0.917 | 1.087 | 0.968 | 0.894 | 1.049 |
| nature_mdlF Burns vs Occ disea | 1.790* | 1.460 | 2.195 | 1.425* | 1.187 | 1.710 |
| nature_mdlF Contusion vs Occ disea | 1.241* | 1.121 | 1.373 | 1.122* | 1.020 | 1.233 |
| nature_mdlF Cuts vs Occ disea | 1.606* | 1.439 | 1.793 | 1.483* | 1.338 | 1.643 |
| nature_mdlF Fracture vs Occ disea | 1.438* | 1.302 | 1.587 | 1.335* | 1.217 | 1.464 |
| nature_mdlF Hernia vs Occ disea | 1.958* | 1.674 | 2.289 | 1.676* | 1.457 | 1.928 |
| nature_mdlF Multiple vs Occ disea | 0.932 | 0.808 | 1.075 | 0.853* | 0.745 | 0.977 |
| nature_mdlF No physic vs Occ disea | 1.135 | 0.525 | 2.454 | 1.308 | 0.617 | 2.776 |
| nature_mdlF Scratches vs Occ disea | 1.496* | 1.143 | 1.959 | 0.983 | 0.773 | 1.251 |
| nature_mdlF Sprains vs Occ disea | 1.089* | 1.010 | 1.175 | 1.032 | 0.961 | 1.109 |
| nature_mdlF Unknown vs Occ disea | 1.221 | 0.765 | 1.948 | 0.928 | 0.607 | 1.417 |

* Significant at P <0.05

# Appendix E: Model Fit Statistics

## Statistics for Appendix C:

## State Fund Data - Time Loss, Probability of Employment at Year 1

| Association of Predicted Probabilities and Observed Responses | | | |
|---|---|---|---|
| Percent Concordant | 67.5 | Somers' D | 0.354 |
| Percent Discordant | 32.1 | Gamma | 0.356 |
| Percent Tied | 0.5 | Tau-a | 0.140 |
| Pairs | 613934846 | c | 0.677 |

| Model Fit Statistics | | |
|---|---|---|
| Criterion | Intercept Only | Intercept and Covariates |
| AIC | 65194.493 | 60840.869 |
| SC | 65203.419 | 61126.526 |
| -2 Log L | 65192.493 | 60776.869 |

| | | | |
|---|---|---|---|
| R-Square | 0.0763 | Max-rescaled R-Square | 0.1105 |

| Testing Global Null Hypothesis: BETA=0 | | | |
|---|---|---|---|
| Test | Chi-Square | DF | Pr > ChiSq |
| Likelihood Ratio | 4415.6232 | 31 | <.0001 |
| Score | 4405.5334 | 31 | <.0001 |
| Wald | 4009.1330 | 31 | <.0001 |

| Type 3 Analysis of Effects | | | |
|---|---|---|---|
| Effect | DF | Wald Chi-Square | Pr > ChiSq |
| CLMT_SEX_CODE | 1 | 0.4823 | 0.4874 |
| CLM_MARTL_STAT_CODE | 1 | 2.6775 | 0.1018 |
| injage_recoded | 2 | 159.0716 | <.0001 |
| sic_cat | 8 | 229.8576 | <.0001 |
| sizeclassA | 8 | 189.6846 | <.0001 |
| PRE_INJ_QRTS_WKDF | 8 | 1340.1229 | <.0001 |
| Rrealw_mY1F | 3 | 448.4993 | <.0001 |

## State Fund Data - Medical Only, Probability of Employment at Year 1

| Association of Predicted Probabilities and Observed Responses | | | |
|---|---|---|---|
| Percent Concordant | 69.8 | Somers' D | 0.404 |
| Percent Discordant | 29.5 | Gamma | 0.406 |
| Percent Tied | 0.7 | Tau-a | 0.107 |
| Pairs | 5223408864 | c | 0.702 |

| Model Fit Statistics | | |
|---|---|---|
| Criterion | Intercept Only | Intercept and Covariates |
| AIC | 172789.08 | 159002.96 |
| SC | 172799.28 | 159329.31 |
| -2 Log L | 172787.08 | 158938.96 |

| | | | |
|---|---|---|---|
| R-Square | 0.0674 | Max-rescaled R-Square | 0.1159 |

| Testing Global Null Hypothesis: BETA=0 | | | |
|---|---|---|---|
| Test | Chi-Square | DF | Pr > ChiSq |
| Likelihood Ratio | 13848.1235 | 31 | <.0001 |
| Score | 15026.2860 | 31 | <.0001 |
| Wald | 13107.3025 | 31 | <.0001 |

| Type 3 Analysis of Effects | | | |
|---|---|---|---|
| Effect | DF | Wald Chi-Square | Pr > ChiSq |
| CLMT_SEX_CODE | 1 | 43.6083 | <.0001 |
| CLM_MARTL_STAT_CODE | 1 | 30.2057 | <.0001 |
| injage_recoded | 2 | 137.8020 | <.0001 |
| sic_cat | 8 | 286.9893 | <.0001 |
| sizeclassA | 8 | 151.5145 | <.0001 |
| PRE_INJ_QRTS_WKDF | 8 | 4537.4595 | <.0001 |
| Rrealw_mY1F | 3 | 1613.7291 | <.0001 |

## Statistics for Appendix D:

## State Fund, Detailed Analysis of Time Loss Cases, Probability of Employment at Year 1

| **Association of Predicted Probabilities and Observed Responses** | | | |
|---|---|---|---|
| **Percent Concordant** | 68.1 | **Somers' D** | 0.365 |
| **Percent Discordant** | 31.5 | **Gamma** | 0.367 |
| **Percent Tied** | 0.4 | **Tau-a** | 0.145 |
| **Pairs** | 613934846 | **c** | 0.683 |

| **Model Fit Statistics** | | |
|---|---|---|
| **Criterion** | **Intercept Only** | **Intercept and Covariates** |
| **AIC** | 65194.493 | 60567.569 |
| **SC** | 65203.419 | 60987.128 |
| **-2 Log L** | 65192.493 | 60473.569 |

| | | | |
|---|---|---|---|
| **R-Square** | 0.0813 | **Max-rescaled R-Square** | 0.1178 |

| **Testing Global Null Hypothesis: BETA=0** | | | |
|---|---|---|---|
| **Test** | **Chi-Square** | **DF** | **Pr > ChiSq** |
| **Likelihood Ratio** | 4718.9232 | 46 | <.0001 |
| **Score** | 4679.2229 | 46 | <.0001 |
| **Wald** | 4236.1006 | 46 | <.0001 |

| **Type 3 Analysis of Effects** | | | |
|---|---|---|---|
| **Effect** | **DF** | **Wald Chi-Square** | **Pr > ChiSq** |
| **CLMT_SEX_CODE** | 1 | 8.9414 | 0.0028 |
| **CLM_MARTL_STAT_CODE** | 1 | 14.6177 | 0.0001 |
| **injage_recoded** | 2 | 167.5092 | <.0001 |
| **sic_cat** | 8 | 229.7568 | <.0001 |
| **sizeclassA** | 8 | 201.1617 | <.0001 |
| **PRE_INJ_QRTS_WKDF** | 8 | 1360.2572 | <.0001 |
| **Rrealw_mY1F** | 3 | 475.1898 | <.0001 |
| **CLM_DEP_QTY_recoded** | 4 | 34.0981 | <.0001 |
| **nature_mdlF** | 11 | 253.9541 | <.0001 |

## State Fund, Detailed Analysis of Time Loss Cases, Probability of Employment at Year 2

| **Association of Predicted Probabilities and Observed Responses** | | | |
|---|---|---|---|
| **Percent Concordant** | 67.0 | **Somers' D** | 0.343 |
| **Percent Discordant** | 32.6 | **Gamma** | 0.345 |
| **Percent Tied** | 0.4 | **Tau-a** | 0.155 |
| **Pairs** | 700212950 | **c** | 0.672 |

| **Model Fit Statistics** | | |
|---|---|---|
| **Criterion** | **Intercept Only** | **Intercept and Covariates** |
| **AIC** | 71742.607 | 67124.841 |
| **SC** | 71751.534 | 67544.4 |
| **-2 Log L** | 71740.607 | 67030.841 |

| | | | |
|---|---|---|---|
| **R-Square** | 0.0812 | **Max-rescaled R-Square** | 0.1120 |