

#### **IV. Delivery System Efficiency: Methodology and Variables**

A comparison of the actual adjusted manual rates paid by employers in Ontario with rates paid by competitor firms in other jurisdictions is an economically significant question and one that is likely to be an important issue for Ontario employers. However, the delivery system efficiency of the workers' compensation program, i.e., the costs associated with delivering benefits and services of a particular quality to program stakeholders, is also an important issue, and is one that cannot be addressed by an examination of the employers' costs of workers' compensation alone. Workers' compensation costs can vary across jurisdictions due to a variety of factors, including the generosity of benefits or the differences in risk of injury among similar industries and occupations.

Consequently, it is necessary to control for these other differences among workers' compensation programs that affect costs in order to determine the relative delivery system efficiency (or, alternatively, the relative costs of the delivery system) of the Ontario program. Our methodology for this task is described in the next section.

##### **A. Methodology for Estimating the Determinants of Inter-jurisdictional Cost Differences**

To guide our efforts, we utilized an accounting model of workers' compensation that assumes that the adjusted manual rate is equal to the benefits paid plus a markup (which we call a "loading factor") for expenses and, in the case of private insurance, profits. In turn, benefits paid are a product of (1) the probability that a workers' compensation claim will be initiated, which is a function of the underlying risk of injury and the program's eligibility criteria, and (2) the expected benefits for a claim.

We can represent this model as follows:

$$C = a \times p \times E[B] \tag{1}$$

where  $C$  is the per employee cost of workers' compensation for employers,  $E[B]$  is the expected benefits conditional upon the initiation of a compensable workers' compensation claim,  $p$  is the

probability of a claim, and  $a$  is the markup for administrative expenses and profit. Taking the log of this equation, we have:

$$\ln C = \ln a + \ln p + \ln E[B] \quad (2)$$

Equation (2) implies that, provided we have data on expected benefits and the probability of a compensable claim, we can use least-squares regression analysis to estimate the markup for administrative expenses. More specifically, equation (2) suggests that, to the extent we are able to capture factors affecting expected losses, then the intercept term of a regression equation predicting log costs will provide a useful measure of delivery system efficiency.

In subsection IV.C., we describe the basic regression specification used to estimate the relative delivery system efficiency of the Ontario workers' compensation program.

## **B. Control Variables**

As indicated, accurate measurement of state-specific loading factors is dependent on controlling for the probability that a worker will initiate a workers' compensation claim and the benefits that will be paid if a compensable claim is made. In this section, we describe the data we used to control for inter-jurisdictional variation in these factors.

### **1. Expected Cash Benefits<sup>41</sup>**

Workers' compensation programs pay two types of benefits to workers' who have suffered an injury as the result of an industrial accident or an illness as the result of an occupational disease: (1) cash benefits to claimants who have suffered a work disability or to families of workers who have been killed, and (2) medical and rehabilitative benefits to all workers who have required medical care as the result of their injuries.

In all North American jurisdictions, cash benefits paid to injured workers vary according to the workers' pre-injury wage and the extent and permanency of the worker's disability resulting from the precipitating injury or disease. This means that the measurement of the generosity of a jurisdiction's benefit structure is not a simple and straightforward matter. While in nearly all jurisdictions, the weekly amount paid to disabled claimants is equal to a certain percentage of the

claimant's pre-injury weekly wage (called the replacement rate), subject to minimum and maximum weekly amounts, there are substantial inter-jurisdictional variations in these replacement rates, and the minimum and maximum benefits. Some jurisdictions limit the duration of benefit payments for some types of claimants, and these limits also vary considerably, both within and across jurisdictions. There is also variation with respect to whether and to what extent benefits are indexed over time, whether and to what extent benefits are offset by other public or private insurance programs, the basis for the compensation of permanent partial disability, and a variety of other factors.

We measure the generosity of cash benefits paid by workers' compensation programs, using a standard injury distribution that varies with respect to the most common dimensions determining benefits, such as the claimant's pre-injury wage and extent of disability.<sup>42</sup> After calculating benefits for each claimant in this distribution based on the state or province's statutory benefit formula, we compute the benefits that would be received by the average claimant in the distribution. This yields a number that may be interpreted as the expected benefits paid, conditional on a lost-time injury claim.

Due to the difference in currency between the two countries, it was necessary to further refine our benefit measure. As indicated, the application of the state or province's statutory benefit formula to our injury distribution resulted in an expected benefit, which we will designate  $B_{it}$ , for each jurisdiction ( $i$ ) and year ( $t$ ) in our sample. Using the same actuarial methodology, we then calculated expected benefits for each year and jurisdiction under the assumption that the jurisdiction had adopted the Model Act of the Council of State Governments. We label these benefits measures *standard benefits* ( $S_{it}$ ).<sup>43</sup> Finally, we calculate a "currency-free" benefit index ( $I_{it}$ ) by taking the ratio of expected to standard benefits ( $B_{it}/S_{it}$ ). This benefit index served as our measure of cash benefit generosity.

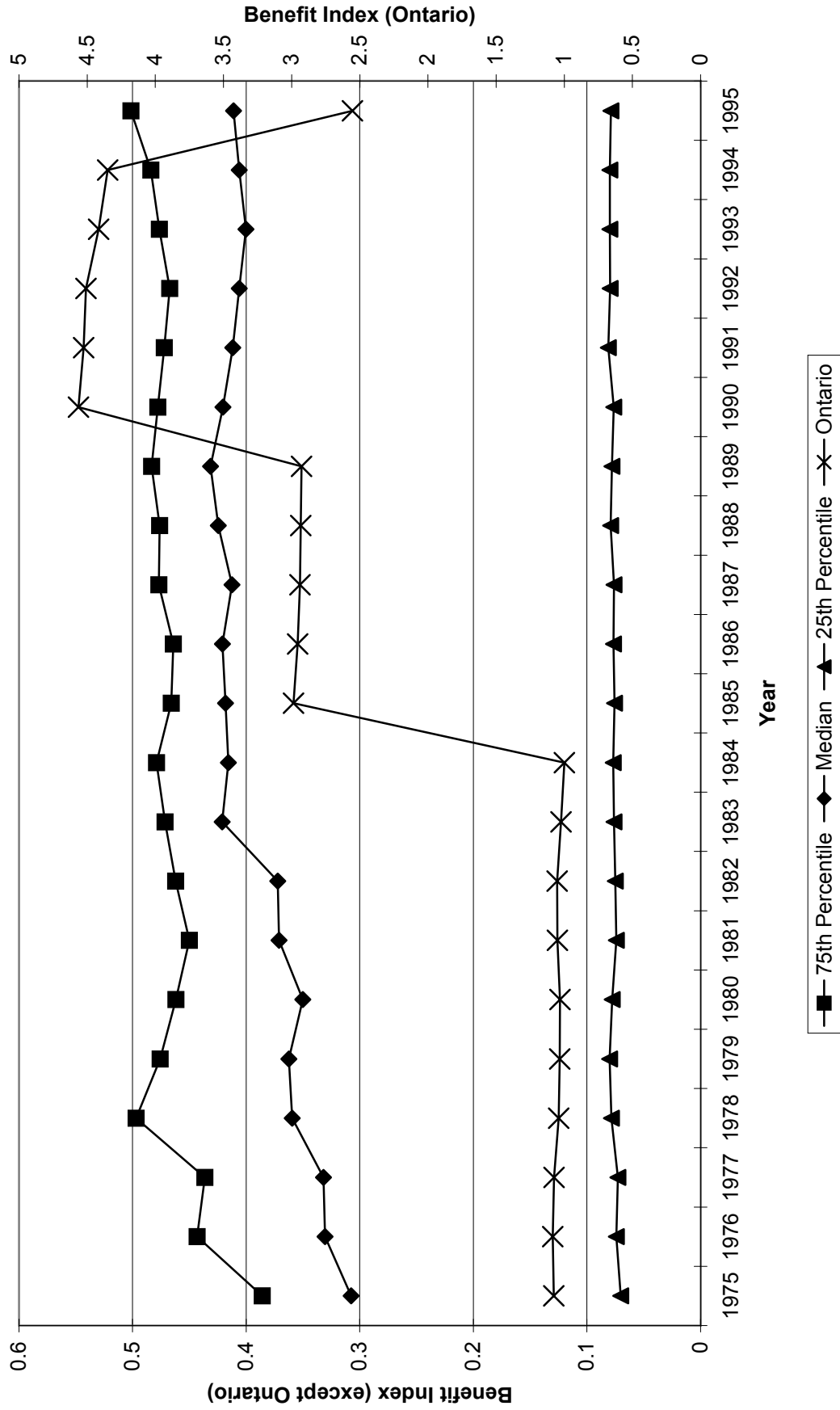
Figure 21 presents data on the benefit index for Ontario for the period 1975 – 1995 as well as the median, 25<sup>th</sup>, and 75<sup>th</sup> percentile index for the remaining jurisdictions. Cash benefits in Ontario are substantially more generous than those in most other North American jurisdictions. Due to these differences in scale, the Ontario index is measured against the scale depicted on the right-hand side of the figure, while the scale on the left-hand side measures the summary statistics for other jurisdictions. As can be seen, the median index for North America rises from a little over 0.3 in 1975 to a little over 0.4 by the end of the period. The 75<sup>th</sup> percentile increases from nearly 0.4 in 1975 to more than 0.5 by 1995. In contrast, the Ontario index never falls below 1. Between 1990 and 1994, the index indicates that Ontario benefits are about 4.5 times those that would be paid under the Model Act.

There are three large jumps in benefit generosity in Ontario, between 1984 and 1985, when the province inaugurated the indexation of long-term and fatal benefits, between 1989 and 1990, when Ontario adopted the dual award for long-term disability, and between 1994 and 1995, when the Friedland formula for indexation was introduced. The data for the rest of North America, which, of course, are primarily for the United States, indicates that benefits rose modestly between 1975 and 1984, a development attributable to improvements encouraged by the report of the National Commission on State Workmen's Compensation Laws (1972).

## **2. Medical Benefits**

It is difficult to construct a measure of the costs of medical care and rehabilitation comparable to the cash benefit index described in the previous section, since we lack both actuarial information on the relative frequency of medical and rehabilitative procedures provided to injured workers and jurisdiction-specific data on the price of those procedures. Consequently, we were forced to rely on actual benefit expenditure data.<sup>44</sup> More specifically, we obtained data on the average per claim costs of medical care for each jurisdiction and year in our sample.

**Figure 21**  
**Cash Benefit Index, 1975-95**

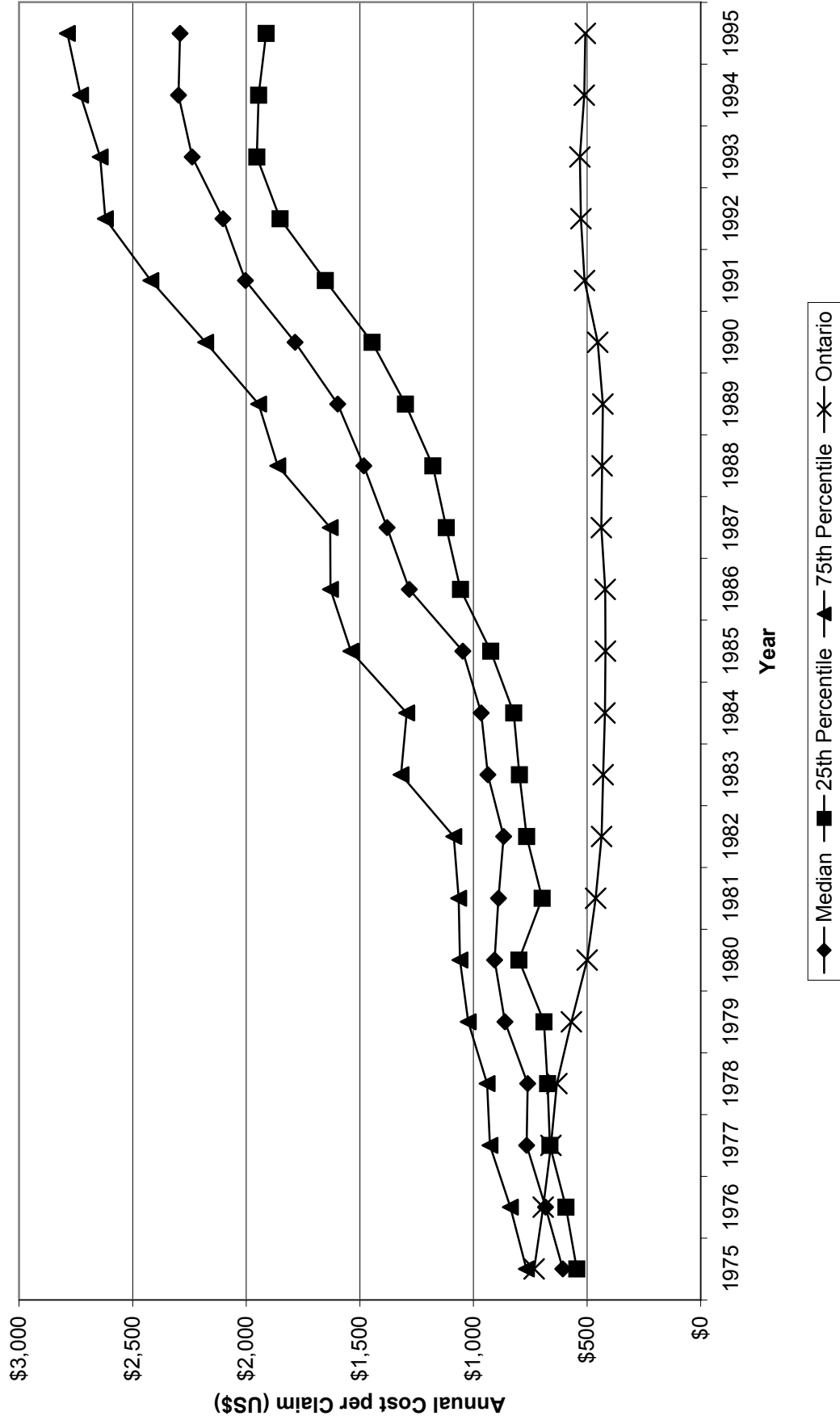


These data came from a variety of sources. Data for monopolistic state funds in the United States came from a publication of the Department of Labor, while data for other U.S. jurisdictions were obtained from unpublished data provided by the NCCI. Statistical supplements to the Annual Report of the Workers' Compensation Board of British Columbia were also used, while the Workplace Safety and Insurance Board provided unpublished data for Ontario.

The NCCI data are reported on an incurred rather than a current basis. That is, the NCCI medical costs data report all costs incurred by injuries occurring in a given year rather than medical costs paid in a given year regardless of the year of injury. Significantly, it is unclear whether the data for British Columbia and the three exclusive state fund jurisdictions in the U.S. are on a current or incurred basis. Unlike our previous study where we used current medical costs data for Ontario, in this study we obtained incurred costs data for 1990 – 1995 and imputed incurred costs for the remaining years.<sup>45</sup>

Medical costs data for Ontario as well as summary statistics on medical costs for the remaining jurisdictions are depicted in Figure 22. As can be seen, medical benefit costs in Ontario have diverged substantially from their levels in other North American jurisdictions. Ontario medical costs in real terms declined between 1975 and 1982. Since then they have remained relatively stable, rising only slightly in the late 1980s and not ever reaching levels seen at the beginning of the study period. In contrast, real medical costs in the United States increased throughout the study period, particularly during the 1980s and early 1990s. By the end of the period, medical benefit costs in the United States were over four times greater than similar costs in Ontario.

**Figure 22**  
**Real Medical Benefit Costs, 1975-95**



### 3. Injury Rates

As indicated, the employers' costs of workers' compensation may vary among jurisdictions due to differences in the industrial composition of employment. A state or province with a large proportion of workers employed in high-risk occupations or industries will have a higher injury rate and, consequently, higher workers' compensation costs. While our costs measures control for these inter-jurisdictional differences in employment composition, we also include an injury rate variable in our regression specifications to control for the possibility of within-industry differences in the risk of occupational accidents.

Since our cost measure accounts for inter-jurisdictional differences in industrial composition uses a homogenous set of rate groups, our injury rate measure also had to be independent of these inter-jurisdictional differences. Consequently, we computed a weighted average injury rate for each jurisdiction and year by combining injury rates for the major industrial divisions, using U.S. national employment as weights.<sup>46</sup> That is, injury rate data for each industrial division were first collected, for each jurisdiction and year in our sample. These data were then aggregated into a state and year-specific average by using a U.S. national distribution of employment by industry division. Significantly, these injury rate data comprehend both lost-time and non-lost-time injuries.

Data for U.S. states and the District of Columbia were taken from unpublished data obtained from the U.S. Department of Labor. Data for British Columbia were taken from Statistics Canada publication. Unfortunately, these data were only available for 1983-94. Ontario injury rates came from unpublished data furnished by the WSIB.<sup>47</sup> Because we lacked data on non-lost time injuries in Ontario for years prior to 1985, it was necessary to impute these data using the lost-time injury rate. Also, U.S. data are obtained independently of state workers' compensation boards and are different from compensable workers' compensation claims data, whereas data for Ontario and British Columbia are equal to the compensable claims rate. While highly correlated,



the compensable rate may be expected to be consistently lower than the injury rate since some injuries are likely to go unreported and some injuries that are reported will not be deemed compensable.

Figure 23 shows the lost-time annual injury rate for Ontario as well as summary statistics for other North American jurisdictions for the years 1975-95. These data show that the Ontario injury rate is consistently higher than that of other North American Jurisdictions. While the difference may be attributable to more dangerous work environments in Ontario, it may also be due to more liberal eligibility criteria or claims administration that resulted in a greater proportion of claims being deemed compensable, particularly at the beginning of the period. Injury rates throughout North America declined over this period, but this decline was particularly marked in Ontario. The median rate for North American jurisdictions dropped from a little over 10 injuries per 100 workers annually to somewhat more than 7 injuries. Similarly, the Ontario injury rate fell from around 16 per year to a little more than 10 per year. Finally, with the exception of the middle and late 1990s, the summary statistics for North American jurisdictions are negatively correlated with the unemployment rate.

#### **4. Long-Term Disability Claims as a Proportion of Total Claims**

Benefits paid to claimants who have suffered a permanent partial disability represent a substantial proportion of all cash benefits paid to workers' compensation claimants. While our cash benefit index captures statutory variations in benefit generosity of PPD benefits among jurisdictions, there are also significant differences among states and provinces with respect to the administration of long-term disability benefits that affect costs (Thomason 1993; Durbin and Kish 1998). A claimant who may be deemed eligible for permanent disability benefits in Province A may be denied benefits in Province B. To control for these differences, we included a measure of the number of long-term disability claims as a proportion of the total number of lost-time claims.

**Figure 23**  
**Injury Rates, Ontario and North America**

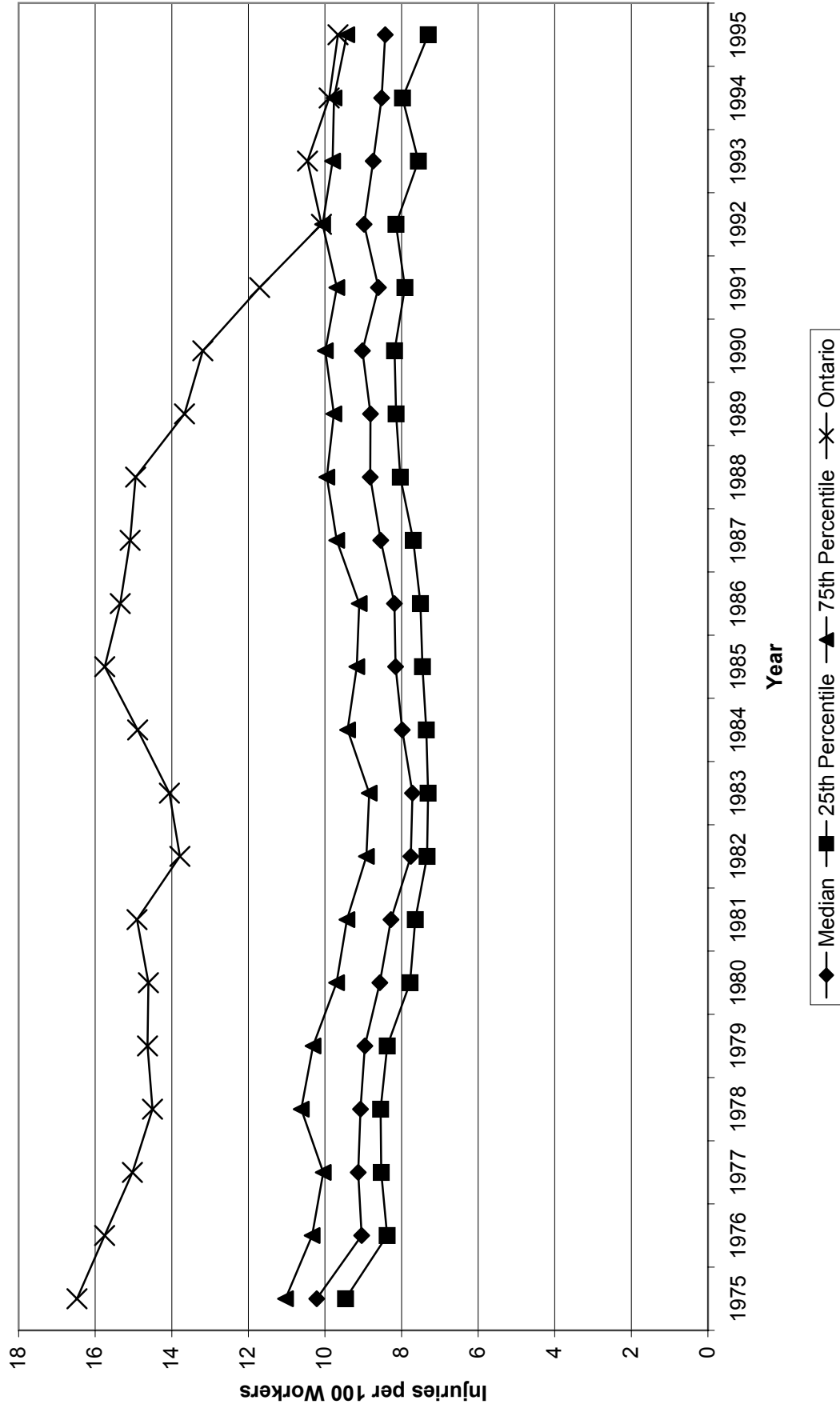


Figure 24 depicts changes in the proportion of total lost-time claims that involve long-term disability for Ontario and other North American jurisdictions.<sup>48</sup> As can be seen, this proportion has grown substantially in the United States in recent years as the median proportion increased from about 12-13 percent to 17-18 percent during the study period. On the other hand, while the long-term disability claims as a share of total lost-time injuries also increased in Ontario between 1975 and 1991, since that time it has fallen. Importantly, these data also show that the number of long-term disability claims as a share of total claims is far below that of most other North American jurisdictions.

### **5. Union Density**

Several studies examining workers' compensation benefit utilization have shown that the claims rate tends to be higher when workers are unionized than when they are not (Hirsch, MacPherson, and Dumond (1997)). This finding has been attributed to: (1) due process protections negotiated by unions as a part of their collective agreements with employers, whereby unionized workers are shielded from employer recrimination – protections unavailable to the unorganized; (2) greater access to information about worker rights under state and provincial workers' compensation laws; (3) greater access to representation during the claim adjudication process. For all of these reasons, we have included a measure of union influence, the proportion of workers in the jurisdiction who are members of a labor organization.

Figure 25 displays union density data for Ontario as well as summary statistics for the other North American jurisdictions in our sample. Once again, the Ontario data are quite different from those of other jurisdictions. Median union density for other jurisdictions fell substantially during this period, from about 20 percent in 1975 to less than 15 percent by 1995. The biggest drop occurred between 1979 and 1984, although density continued to decline during the remainder of the period. In contrast, union density in Ontario remained relatively stable for most of the study period, and even increased slightly over the last six years. In addition, Ontario union density was greater than the 75<sup>th</sup> percentile density for the remaining jurisdictions since 1983.

Figure 24

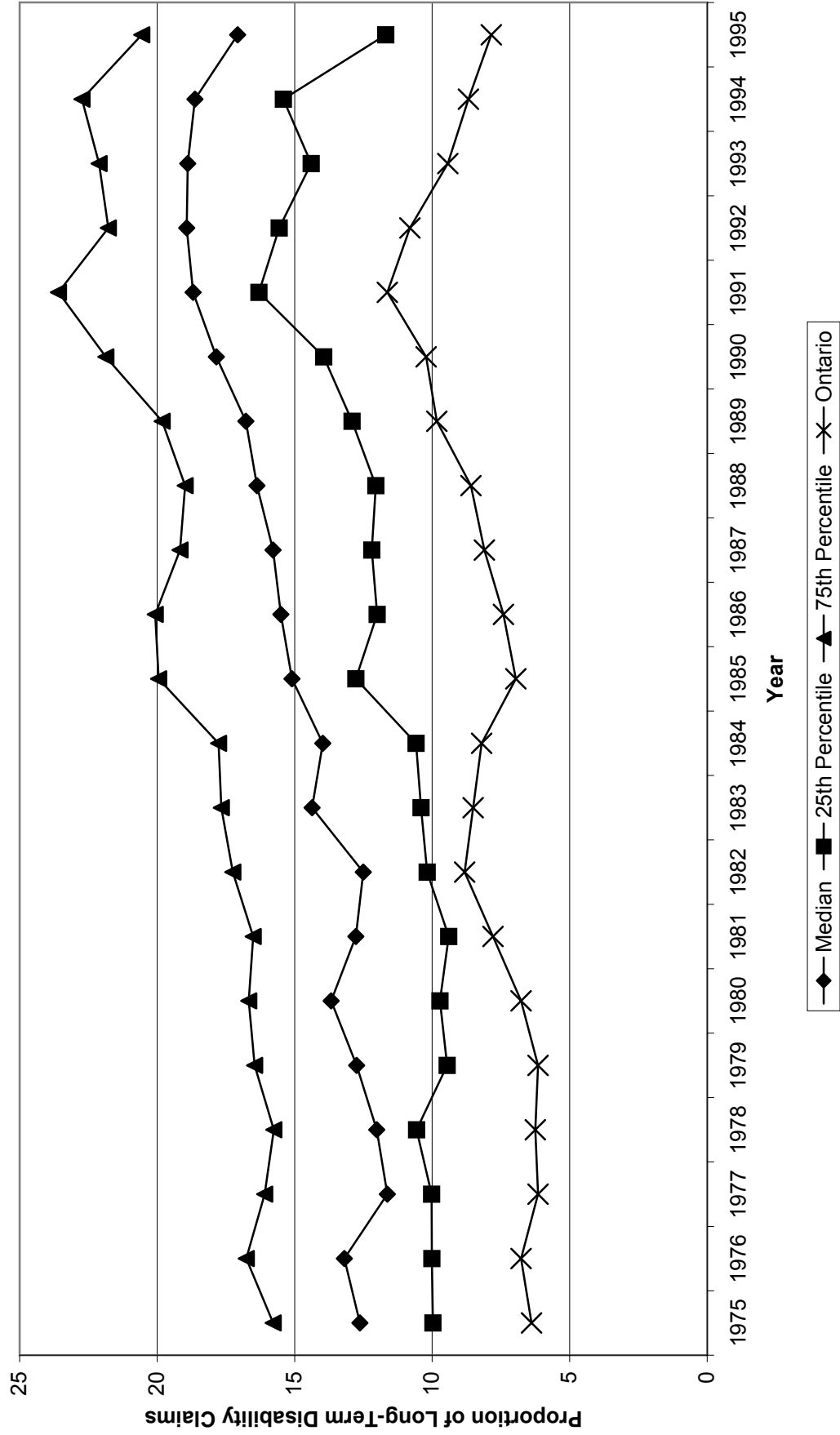
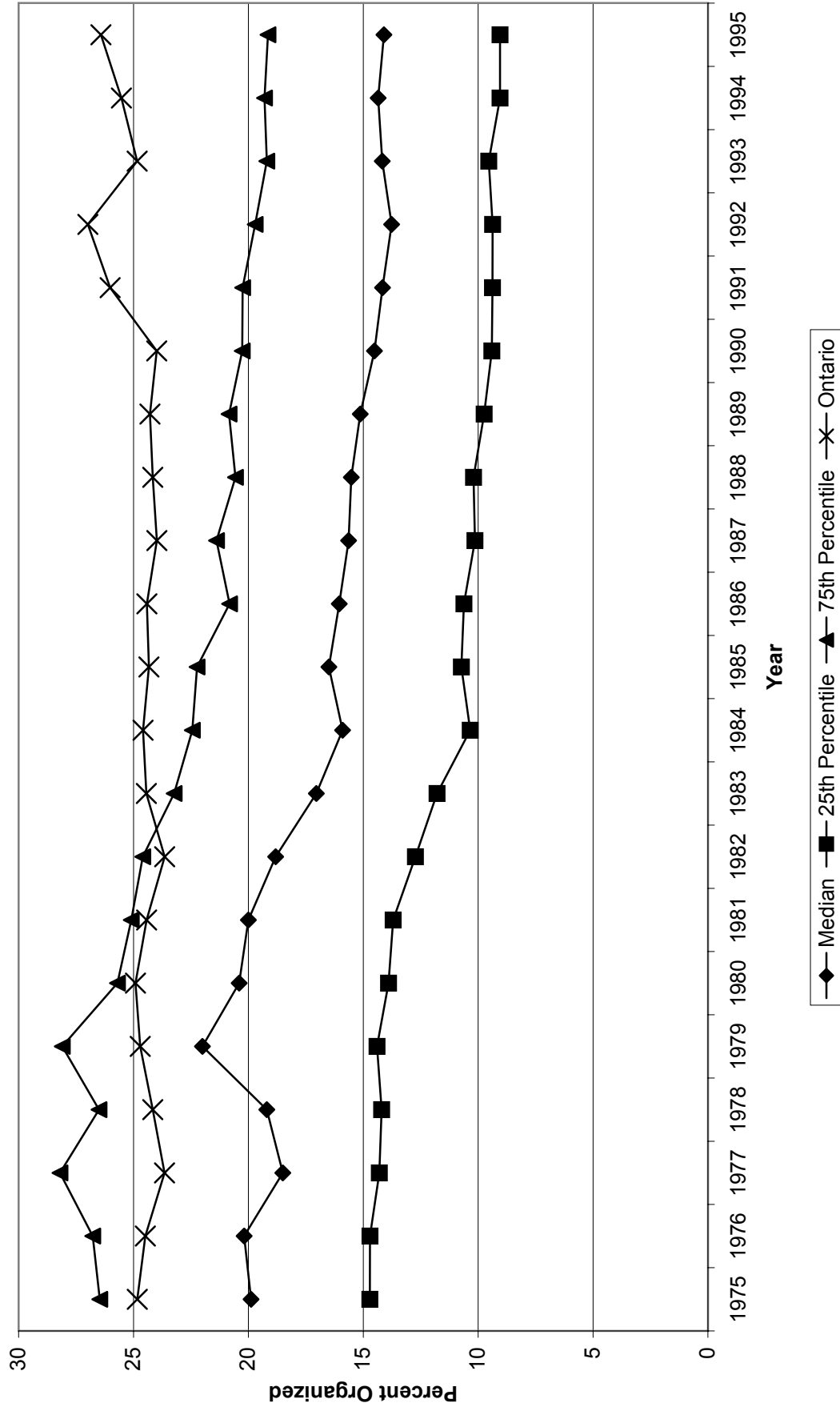


Figure 25



## 6. Coverage

Workers' compensation programs do not cover all workers. Under some workers' compensation statutes, workers engaged in a certain occupations, such as household domestics or farm workers. Other jurisdictions do cover very small employers, e.g., firms that employ five or fewer workers. To the extent that those workers who are excluded from coverage are engaged in high (low) risk activities, then the employers' costs of workers' compensation will be lower (higher) than if those workers were not excluded.

To control for costs differences due to differences in coverage, we included a set of dummy variables that captured differences in workers' compensation coverage rules across jurisdictions. These dummy variables utilized the nine coverage recommendations of the National Commission on State Workmen's Compensation Laws (National Commission 1972). These recommendations are listed in Table 6 along with data indicating the extent to which Ontario and the remaining jurisdictions in our sample are in compliance.

The impact of each of coverage variable depends on whether compliance would include occupations whose risk of injury was higher or lower than the average risk in the jurisdiction. In most instances, it is difficult to determine *a priori* whether extended coverage would increase or decrease average risk. However, since small firms typically have a below-average safety record, we expect that jurisdictions with a size exemption will have lower costs than those jurisdictions in compliance with the National Commission's recommendation, *ceteris paribus*. Otherwise, we have no expectations regarding the effect of the National Commission recommendations.

**Table 6**  
**Coverage Variables, Descriptions, Compliance in Ontario and Other Jurisdictions**

<b>Variable</b>	<b>Description</b>	<b>Ontario</b>	<b>% of Other Jurisdictions in Compliance</b>
<i>Compulsory Coverage</i>	Coverage by workers' compensation laws is compulsory	Yes	93.58%
<i>No Waivers</i>	No waivers are permitted	Yes	49.05%
<i>No Size Exemption</i>	Employers are not exempted from workers' compensation coverage because of the number of their employees.	Yes	69.79%
<i>Farmworkers</i>	Farmworkers are covered on the same basis as all other employees.	Yes	28.95%
<i>Household &amp; Casual Workers</i>	Household workers and all casual workers are covered under workmen's compensation at least to the extent they are covered by Social Security.	No	4.32%
<i>Government Employees</i>	Workers' compensation coverage is mandatory for all government employees.	Yes	60.32%
<i>No Occupational Exemption</i>	There are no exemptions for any class of employees, such as professional athletes or employees of charitable organizations.	No	33.47%
<i>Filing Choice</i>	Employees or survivors are given the choice of filing a workers' compensation claim in the state where the injury occurred, or where the employment was principally localized, or where the employee was hired.	Before 1987 -- No; After 1986 -- Yes	57.06%
<i>Occupational Disease</i>	Full coverage for occupational diseases.	Yes	99.05%

## 7. Summary

In the Section II, we examined workers' compensation costs in Ontario and other North American jurisdictions. The data in that section indicated that, in general, Ontario costs compared favorably with costs in other jurisdictions. However, these data were uninformative concerning the issue of the relative efficiency of Ontario's workers' compensation program. In order to assess the delivery system efficiency of the Ontario program, in this section we developed a statistical model that controls for variables affecting the costs of workers' compensation insurance. Only after controlling for these other factors can we determine whether the relatively low cost of workers' compensation insurance in Ontario is due to one or more of the these control variables – such as the level of cash benefits or the extent of program coverage – or whether the low cost of workers' compensation in Ontario is due to an efficient delivery system, or whether it is due to a combination of efficiency and these other factors. The next subsection discusses the methodology we use to evaluate the relative efficiency of the Ontario program.

### C. Methodology for Determining Delivery System Efficiency

To determine relative efficiency of the Ontario program, we estimate multiple regression equations that control for the factors described above. Differences among jurisdictions with respect to delivery system efficiency are captured using a set of jurisdiction specific dummy variables. Additionally, in order to control for unobserved time-related variation in costs, we include dummy variables denoting the observation year as well as a dummy variable indicating whether a state had a competitive state fund.<sup>49</sup> This model can be represented by the following equation:

$$\ln C_{it} = \sum_k \beta_k X_{kit} + \sum_l \beta_l J_{li} + \sum_m \beta_m Y_{mt} + \varepsilon_{it} \quad (3)$$

where  $C_{it}$  is equal to the employers' costs of workers' compensation in the  $i$ th jurisdiction and the  $t$ th year;  $X_{kit}$  are the independent variables described earlier, i.e., the log of cash benefits, the log of the injury rate, medical costs, etc.;  $J_{li}$  are the jurisdiction dummy variables ( $l = 50$ );  $Y_{mt}$  are the year dummies ( $t = 21$ ),  $\varepsilon_{it}$  is an error term; and  $\beta$  are the estimated coefficients.