

Employer Responses to Workers' Compensation Insurance Experience Rating

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Résumé de l'article

La tarification par incidence vise principalement à améliorer la santé et la sécurité dans le lieu de travail en offrant aux employeurs des stimulants financiers significatifs les incitant à adopter des mesures de prévention des accidents et à faciliter la réadaptation et le renouveau possible des travailleurs blessés. La tarification par incidence vise également à faire en sorte que l'ensemble des cotisations soient réparties de façon plus équitable entre les employeurs. Les incitatifs financiers offerts sous forme de rabais et de surcharges dans le cadre de la tarification par incidence devraient amener les directeurs d'entreprises à adopter des pratiques et des stratégies visant à améliorer la sécurité en portant une attention particulière au bilan de sécurité et en le comparant à la moyenne de l'industrie. Au fil des ans, ces pratiques devraient avoir une incidence sur les mesures de rendement définitives telles que la fréquence des accidents et la durée des périodes d'indemnisation. Le présent document vérifie l'hypothèse voulant que l'application des principes de la tarification par incidence aux cotisations des employeurs produise des changements précurseurs dans leur comportement en matière de sécurité. Ce document tente également de préciser l'étendue de ces changements.

Les données utilisées dans l'analyse visant à déterminer si la tarification par incidence influe sur les pratiques de sécurité des employeurs ont été tirées d'un sondage téléphonique à échantillonnage au hasard, les entreprises étant réparties selon leur taille. Le sondage a été effectué par la Commission des accidents du travail (CAT) de l'Ontario en 1989, auprès d'environ 500 employeurs participant à la Nouvelle méthode expérimentale de tarification par incidence (NMETI). Les renseignements recueillis lors de ce sondage sont utilisés pour établir la probabilité que l'employeur modifiera ses pratiques de sécurité s'il est exposé aux stimulants financiers offerts par la tarification par incidence. En plus du sondage téléphonique, la Commission a effectué des études de cas détaillées sous forme d'entrevues personnelles auprès de trente-cinq importants employeurs de l'Ontario participant aux méthodes de tarification par incidence NMETI ou CAD-7.

Les résultats d'un tel exercice de modélisation logit à plusieurs variables révèlent que les stimulants financiers, sous forme de rabais de prime ou de surcharges qu'offre aux employeurs la tarification par incidence, augmentent considérablement la probabilité que les entreprises modifient leur comportement en matière de sécurité. De fait, les employeurs bénéficiant d'un rabais de prime décaillant de la tarification par incidence et ceux ayant à payer une surcharge avaient respectivement 20,9 % et 17,6 % plus de chances de signaler des modifications dans leurs pratiques de sécurité que ceux n'étant pas exposés à la tarification par incidence.

Il existe un lien positif et significatif du point de vue statistique entre l'embauchage à temps plein de personnel responsable de la santé et de la sécurité dans une entreprise et la probabilité de modifications dans les pratiques de sécurité. En effet, les employeurs qui ont à leur emploi un tel personnel ont presque 18 % plus de chances de modifier leurs comportements en matière de sécurité dans le cadre de la tarification par incidence.

Les employeurs qui comprennent bien ou très bien le fonctionnement de la tarification par incidence seraient beaucoup plus portés à modifier leurs pratiques de sécurité que ceux qui ne le comprennent pas. Étant donné la corrélation positive entre la compréhension des employeurs et la probabilité d'un changement de comportement, on peut conclure que l'organisme qui fixe les taux de cotisation devrait simplifier le lien entre les primes et le rendement en matière d'accidents.

Les gros employeurs ont plus de chances de modifier leurs pratiques de sécurité dans le cadre de la tarification par incidence que les petites entreprises. Selon les paramètres types prévus pour l'étude, plus longue est la période pendant laquelle l'entreprise a été assujettie à la méthode de tarification par incidence, plus il est probable que l'entreprise modifie son comportement en matière de sécurité. Enfin, les employeurs ayant à leur emploi un personnel syndiqué sont moins portés à modifier leur comportement en matière de sécurité que ceux dont le personnel n'est pas syndiqué.

Selon les résultats des études de cas, il apparaît que la tarification par incidence a permis de conscientiser davantage les employeurs relativement aux coûts d'indemnisation et au besoin d'attribuer la responsabilité de ces coûts à la sécurité dans le lieu de travail et à la prévention des accidents. D'ailleurs, la tarification par incidence a eu pour effet d'augmenter de 20 à 40 % les initiatives des employeurs relativement à la santé et à la sécurité dans les domaines touchant la prévention des accidents. Un pourcentage élevé des entreprises ayant participé à l'étude de cas mettent l'accent sur le contrôle des coûts d'indemnisation. En effet, la tarification par incidence a amené les employeurs à porter une plus grande attention à un tel contrôle dans presque toutes ces entreprises, soit dans 96 % d'entre elles. L'incidence des diverses activités reliées au contrôle des coûts d'indemnisation telles que le suivi des demandes d'indemnisation, les appels et les virements au Fonds de garantie pour travailleurs réintégrés (FGTR) est passablement élevée. L'effet marginal de la tarification par incidence sur la gestion des demandes d'indemnisation varie, mais celui-ci est généralement plus important que l'effet marginal qu'exerce la tarification par incidence sur les activités reliées à la prévention des accidents.

À l'exception des programmes de travail modifié et de travaux légers, la tarification par incidence a des résultats et un apport marginal relativement faibles en ce qui touche la prestation de programmes de réadaptation et de recyclage à l'intention des travailleurs blessés.

Il semble que beaucoup d'activités reliées à la gestion des demandes d'indemnisation découlent de l'objectif de la tarification par incidence qui vise à minimiser le nombre de demandes d'indemnisation présentées à la CAT, et, pour chacune d'elles, à minimiser la durée de la période d'indemnisation et les coûts qui y sont reliés.

Les recherches précédentes ont mis l'accent sur les indicateurs des résultats finaux, principalement sur les taux de fréquence des accidents, et ont fourni peu de conclusions convaincantes sur l'efficacité de la tarification par incidence. La présente étude indique au contraire qu'en matière de sécurité, cette méthode a des effets marginaux remarquables sur les comportements précurseurs des employeurs. Les constatations empiriques portent à croire que la tarification par incidence influe sur de nombreux comportements d'entreprises, et non seulement sur les comportements reliés à la prévention des accidents et aux taux de fréquence des accidents.

Employer Responses to Workers' Compensation Insurance Experience Rating

Boris Kralj

This paper investigates the impact of an insurance premium experience rating mechanism that is designed to induce firms to reduce the incidence of workplace accidents and accident claims costs. Logit model analysis of survey-response data and case study information are used to analyze the impact of the introduction of workers' compensation insurance premium experience rating on employer behaviour in Ontario. The key result is that the financial incentives provided by experience rating have induced employers to alter their behaviours and undertake strategies aimed at both accident prevention (reducing accident frequency rates) and reducing workers' compensation claims costs.

In the current increasingly competitive economic environment, greater attention is being placed by governments and employers on issues related to escalating costs such as workers' compensation. Experience rating of insurance premiums is increasing in importance for a host of policies ranging from workers' compensation to unemployment insurance. It is an important public policy question and deserves serious attention. Workers' compensation insurance premium experience rating is available in some form to at least some industry groups in nine out of twelve Canadian jurisdictions. The majority of these programs have been set up or undergone major revisions in the last decade. Unlike in the United States, workers' compensation experience rating is a relatively new feature of the Canadian system.

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Over the last decade it has been recognized by most provinces that the collective or pooled risk approach to workers' compensation rate making resulted in financial disincentives in the area of occupational health and safety. The pooled risk mechanism provides very little, if any, incentive for individual firms to allocate resources to activities that reduce workplace hazards or to monitor injured workers' progress since the insurance premium is determined based on the claim cost experience of the industry or rate group average rather than its own experience. Experience rating shifts, at least partially, the responsibility for workers' compensation costs from the rate group to the particular employer incurring the accident costs. Experience rating tailors a firm's workers' compensation insurance premiums to reflect its individual workplace injury experience. It penalizes, through premium surcharges, firms which have relatively poor accident records while rewarding those with relatively good experience with premium refunds.

The primary objective of experience rating is to induce an improvement in health and safety performance in the workplace by providing a meaningful financial incentive for employers to adopt measures aimed at accident prevention and to facilitate the rehabilitation and eventual re-employment of injured workers. A secondary, and related, objective is to secure a more equitable distribution of the overall assessment premium burden amongst individual employers.

Economic research on the Canadian workers' compensation system as a whole has been relatively scarce when compared to the volumes of research dealing with other social insurance programs such as unemployment insurance. This is particularly true when it comes to assessing the impacts of experience rating schemes on employer behaviour. As noted by Ison (1986):

In the contemporary context of workers' compensation in Canada, there is probably nothing that is so fervently supported or so little understood as experience rating. Proposals for the widespread expansion of experience rating have been made and adopted, yet with no analysis of the consequences and with no reasons being given that could withstand serious reflection. (p. 723)

No experience rating program has ever been introduced in Canada (or elsewhere to my knowledge) in conjunction with any research that would even attempt any measure of its significance. (p. 738)

While the majority of North American jurisdictions have implemented some form of workers' compensation experience rating support for the concept is by no means universal. Critics, both inside and outside the labour movement, have expressed misgivings that the theoretical advantages to be obtained in terms of improved workplace safety performance and reduced injury rates may be largely illusory, replaced in practice by an increased employer focus on accident claims cost control measures rather than accident prevention.

Proponents of experience rating have argued that while the efficacy of experience rating as an injury prevention device may be uncertain, its undoubted theoretical promise in this regard makes it worthwhile to pursue. Employer community representatives often express the view that experience rating is needed to redistribute the costs of workers' compensation more equitably. As a result there is strong support for experience rating by employers. Experience rating is supported on the grounds of horizontal equity as it is inequitable to hold all employer's responsible for the accident costs occasioned by the actions of one employer. Experience rating at the individual employer level within industry rate groups corrects for the inequities of classification — low risk employers subsidizing high risk employers. Therefore, a failure to experience rate would yield a competitive advantage to careless firms and in effect penalize the cautious.

The labour community's view of experience rating has generally been that while it supports the goal of reducing the frequency and severity of work related accidents, it is also concerned about ensuring that injured workers' access to compensation benefits remains fully protected. Labour representatives have frequently voiced concerns regarding the potential negative impacts of experience rating, particularly its potential for creating greater adversarial conflict within the system and the financial incentives it may give for the concealment of claims. In Ontario, the Ontario Federation of Labour has recommended that the Ontario Workers' Compensation Board (WCB) abandon experience rating.

In general, labour spokespersons object to the deviation from the principle of collective liability. As noted by Hunt (1992), labour representatives would prefer one single workers' compensation assessment rate for every employer. They believe that linking workers' compensation premiums to claims costs produce excessive employer "interest" in claims and diverts employer attention from accident prevention.

The research literature does not adequately resolve the issue of whether experience rating improves safety performance, which is demonstrated by the fact that both sides sometimes cite the same articles to bolster their arguments. This paper presents some new evidence concerning experience rating effects on employer behaviour within the Canadian context.

WORKERS' COMPENSATION AND EXPERIENCE RATING

Workers' compensation is a social insurance program providing cash benefits, medical care, and rehabilitation services to workers disabled by work-related injuries or diseases. Distinctive from most social insurance programs in Canada, workers' compensation programs were created and are currently

operated at the provincial rather than at the federal level. Workers' compensation is also the oldest social insurance program in Canada; in 1915 Ontario enacted the first workers' compensation legislation.

The workers' compensation system represents a historic balancing of the worker's need for assured compensation and the employer's need for predictability and protection from tort liability. Injured employees receive a cash benefit to compensate for lost wages and payment of medical costs associated with injury or disease. Workers' compensation is a no-fault insurance plan. Every person who is injured in an employment-related accident is entitled to compensation benefits. Entitlement to compensation is not dependent on the worker providing proof that the employer was negligent, nor is compensation denied because of the negligence of the worker. The presence or absence of blame, fault or negligence is irrelevant to entitlement.

The workers' compensation system provides two main types of indemnity benefits based on the type of claim filed. First, temporary total disability benefits are provided to workers who are totally unable to work in the initial period after the injury but are expected to recover fully. In most provinces these benefits are set at 90 percent of the workers after tax pre-injury weekly earnings subject to a maximum and minimum payment. Temporary total benefit payments account for about three-quarters of total workers' compensation payments. Second, permanent partial disability benefits are paid to those workers that, even following a period of recovery, are expected to suffer a permanent impairment, functional limitation or loss of earning capacity. Permanent partial claims usually undergo a period of temporary total disability. Other types of benefits include those paid to temporary partial disability, permanent total disability and death claims. However, these types of claims are relatively rare. Generally in Canada, unlike in the United States, there is no waiting period before benefits are paid.¹

Unlike other public programs that are financed by levies on the general taxpayer or on employees, workers' compensation in the United States and Canada is financed entirely by assessments levied on employers. In 1990 the Ontario WCB collected \$2.5 billion in assessment premium revenues from the province's 190,000 registered employers and it provided compensation to about 400,000 employees injured in the workplace.

In Canada, annual assessments or insurance premiums are determined by applying an assessment rate per one hundred dollars of each employer's assessable payroll. The rate reflects the average injury claim costs experience in an industry class or rate group. The average assessment rate in Ontario has increased from \$1.65 in 1980 to \$3.18 in 1990. All employers in the same rate

¹ The only exception is Nova Scotia which has a three day waiting period.

group pay the same assessment rate, regardless of their individual injury claim cost record. The difficulty with this approach is that it makes no distinction within rate groups between employers who have good accident records and employers who have poor accident records.

Experience rating tailors an employer's workers' compensation insurance premium to reflect their individual workplace accident experience. Experience rating in Ontario was first introduced in 1953. It was expanded to include more industries and was made more aggressive, in terms of larger financial rewards and penalties, in 1984. As of 1991, the Ontario Workers' Compensation Board operated three separate experience rating programs which covered about 70 percent of all employers in the province. More detail on Ontario's experience rating programs is provided in the appendix.

ECONOMIC BEHAVIORAL MODEL AND HYPOTHESIS TO BE TESTED

The neoclassical model of the profit-maximizing (cost-minimizing) employer whose workforce is exposed to the risk of injury, predicts that employers will respond to the economic incentives provided by experience rating by allocating resources to activities that reduce their workers' compensation accident costs up to the point where their marginal benefits equal their marginal costs. The firm may either allocate resources to safety practices or pay the costs associated with work injury. Profit maximizing employers, operating in competitive markets, strive to minimize the sum of the cost of workplace accidents and the costs of preventing injuries. The former consist of workers' compensation premium payments, including experience rating surcharges/refunds, as well as material costs, fixed employment costs, lost production time and damage to equipment.

The employer can reduce his costs of occupational injuries by preventing accidents as well as by engaging in activities that minimize the costs of accidents once they occur. We can divide these latter activities into two categories: intended and unintended. Activities which were intended to be generated by experience rating are actions that minimize the severity of the injuries likely to be caused by an accident as well as activities aimed at minimizing the injured workers' duration of absence from work. This may include the provision of protective equipment such as safety goggles, protective headgear, machine guards and in-plant first aid. Medical rehabilitation, retraining and job modification activities may also be included in this category. Unintended employer activities which can result in workers' compensation accident cost reductions include excessive claims management, sub-contracting of most hazardous activities, excessive demand for Second Injury and Enhancement

Fund (SIEF) relief, excessive or frivolous protests and appeals of injured workers claims.²

In most circumstances a firm would invest in all of these types of activities, however, the optimal mix of resources allocated to each will be determined by the costs of each option relative to the benefits (i.e. the reduction in expected total cost of accidents) that it achieves.

The financial stimulus provided by the experience rating mechanism is hypothesized to spur firm managers to adopt practices or strategies to improve their safety performance by focusing their attention on their safety record relative to the industry average. Over time these practices are expected to impact final outcome performance measures such as injury frequency and duration on benefits. The time lag between the imposition of the financial stimulus and changes in firm behaviours and impacts on final outcome measures may vary from a few months to years depending on the availability of information to management, the size of the financial incentive as well as the management style (corporate culture) and organizational structure of the firm.

If the economic incentive offered by workers' compensation experience rating is sufficient in magnitude, an intermediate result would be that this will cause changes in employers' safety related practices. These activities may be aimed at accident prevention and/or post-injury containment of claim severity and cost. As a result, it is reasonable to assume that this will eventually translate into changes in final outcome measures — reduction in injury frequency rates and injury severity (duration). Modification of firm safety behaviour is a precursor to observing any impacts of experience rating on final outcome measures. While it is important to determine whether or not experience rating affects final outcome measures, it is also equally important to ascertain how the result is achieved.

This paper tests the hypothesis that experience rating of workers' compensation insurance premiums leads to the intermediate changes in employer safety behaviours. It also attempts to identify the range of those behaviour changes.

PREVIOUS RESEARCH

Despite the extensive use of workers' compensation experience rating over a relatively long time period in various United States jurisdictions there are only a handful of published empirical studies that examine the impact of

² SIEF relieves the individual employer of all, or a portion of the costs of a claim if a pre-existing condition enhances or prolongs a worker's compensable disability. These costs are removed from the individual employer's accident cost record and are spread among all employers.

experience rating on the incidence of injuries. Only one of these examines the Canadian experience.

Almost all of the U.S. studies exploit the institutional characteristic that larger firms tend to be more highly experience rated and test the hypothesis that the positive relationship between workers' compensation benefits and injury rates is smaller for larger firms. These studies include separate controls for benefit levels, firm size, and an interaction between firm size and benefit levels. It is this latter term that is intended to pick up the effects of experience rating. If experience rating does lead to the hypothesized reduction in injury rates the interaction term coefficient should have a negative sign.³

Ruser (1991) tests the experience rating hypothesis using a longitudinal microdata set for approximately 2,800 manufacturing establishments for the period 1979-1984. His results indicate that higher workers' compensation benefits lead to an increase in injury rates and that higher benefits lead to a smaller increase in injuries in larger establishments as the experience rating hypothesis predicts. In an earlier study, Ruser (1985) pooled cross section and time series data on 25 manufacturing industries in 41 states over the period 1972-1979. The empirical results confirmed the hypothesis of a smaller relationship between benefits and injuries for large firms.

Worrall and Butler (1988) test the experience rating hypothesis using a data set consisting of pooled cross section data on fifteen industries in South Carolina over the period 1940-1971. They estimate equations for three different sets of injury rates: permanent partials, temporary totals, and an index of all indemnity claim rates. Their results for permanent disabilities support the experience rating hypothesis but the data on temporary total disabilities, the most common type of injury, does not.

Chelius and Smith (1983) analyzed the effect of experience rating by estimating the within-state differences in the injury rates of large experience rated firms and small non experience rated firms. The data consisted of 1979 Bureau of Labour Statistics information on injury rates, by firm size, for 15 two-digit industries across 37 states. They argued that if experience rating works, the injury rates for large firms should be lower relative to the injury rates for small firms in states with higher benefit levels. The results of testing

³ One major limitation of using data from the United States to test the hypothesized relationship between experience rating and workplace safety is that no direct measure of the degree of experience rating employed by private insurers is available. As a result most United States studies utilize firm size (number of employees) as a proxy for experience rating. It would be more useful to obtain data which would allow for a direct comparison of experience rated with non experience rated firms. The Canadian experience will allow for such a pre- and post-experience rating comparison given that the vast majority of Canadian jurisdiction have only introduced experience rating within the last decade and that not all firms are necessarily experience rated.

this hypothesis were generally negative, they concluded that their data did not support the claim that experience rating affects injury rates.

Krueger's (1990) effort was the first to consider the effect of insurance premium rate setting on claim duration. Krueger utilized a micro level data set consisting of approximately 27,000 temporary total disability claims from administrative records in Minnesota. He finds that injured workers of self-insured (i.e. perfectly experience rated) firms tend to return to work faster (i.e. experience lower duration) than workers of imperfectly experience rated firms who suffer similar injuries. Specifically, Krueger's results indicate that these firms have approximately a ten per cent shorter average duration.

Lanoie (1992) uses data at the two-digit industry level from Quebec covering 28 industries during the period 1983-1987 to estimate accident frequency and severity (claim duration) equations. He approximates the degree of experience rating per industry by a variable defined as the number of experience rating classes in a given industry divided by the number of employees. The results for accident frequency indicated that this proxy variable was negative as expected, but not statistically significant at the 5 percent level. With respect to claim duration, he found no support for the hypothesized negative relationship between the experience rating and claim duration. In fact, he concluded that the experience rating of workers' compensation premiums had a *positive* and statistically significant effect on claim duration. He provided no explanation for this unexpected result. This is the only published study to date that looks at experience rating in the Canadian setting.

DATA SOURCES, DEFINITIONS AND EMPIRICAL MODEL

The data utilized in the analysis of whether experience rating impacts on employer safety practices was obtained from a random sample telephone survey administered by the Ontario WCB in 1989 of approximately 500 employers participating in the New Experimental Experience Rating (NEER) experience rating program. The sample was stratified by firm size with larger employers being oversampled. The data set consists of 217, 142 and 155 completed surveys of small, medium and large employers respectively. The survey questionnaire collected information on employer awareness and understanding of the experience rating program as well as on whether it had led to changes in employer safety related practices.⁴

Information collected by this survey is used to model the probability that an employer will alter his or her safety related practices as a result of being subjected to the financial stimulus provided by experience rating (i.e. premium

⁴ A copy of the survey instrument is available from the author on request.

refunds and surcharges). A description of the variables used in the modelling exercise are provided in Table 1. Since the dependent variable in the data set is dichotomous, qualitative response modelling techniques were employed. Specifically, the logit specification was used.⁵ The dependent variable (Change_S) is equal to one if the employer changed his or her safety related practices due to experience rating, zero otherwise.

In addition to the random telephone survey, detailed personal interview case studies were conducted on thirty-five large Ontario employers enrolled in the NEER and Council's Amended Draft #7 (CAD-7) experience rating programs. Small firms were excluded from the case studies in an attempt to balance the value of the information obtained against the costs of obtaining it. These studies consisted of a number of detailed personal interviews conducted with individuals at different levels within a targeted employer. With each study the researcher collected background information, conducted sufficient number of internal interviews and reviewed corporate data to develop an independent understanding of the decision making process and the impact of experience rating incentives on the respondent. The researcher incorporated the reported views of company respondents regarding the effects of incentives and all other information gathered during the case study to form an independent judgement of the *incremental* impacts of the incentives on behaviour. Incremental impact refers to those aspects of employer behaviour that have occurred as a result of participation in experience rating programs, and which would not have occurred otherwise.

EMPIRICAL FINDINGS

Some tabular results from the employer survey are presented in Table 2. We observe that almost all large employers are aware of their industries participation in the experience rating program, this is not the case with small and

⁵ A univariate qualitative response model is defined by

$$P(Y_i = 1) = F(X_i\beta), i = 1, 2, \dots, n$$

where Y_i is a sequence of independent binary random variables taking the value 1 or 0, X_i is a vector of explanatory variables, β , is a vector of unknown parameters, and F is a certain known function. While a number of functional forms of F are often used in applications, the current analysis uses the logistic distribution function;

$$F(X_i\beta) = [1 + \exp(-X_i\beta)]^{-1}$$

The logistic function is interpreted as a probability function since for large positive values of $X_i\beta$, $F(X_i\beta)$ approaches 1; for large negative values of $X_i\beta$ it approaches 0; and when $X_i\beta = 0$ then $F(X_i\beta) = 0.5$. The logit equation is $P = [1 + \exp(-X_i\beta)]^{-1}$ where $P = 1$ if the employer changes his or her safety related practices due to experience rating, zero otherwise.

TABLE 1
Variable Definitions

<i>Variable Name</i>	<i>Description</i>
Change_S	1 = If employer changed safety related practices due to experience rating 0 = Otherwise
Length	Number of years employer has been enrolled in the experience rating program
Small	1 = If employer has less than 10 employees 0 = Otherwise
Medium	1 = If employer has 10 to 100 employees 0 = Otherwise
Large	1 = If employer has more than 100 employees 0 = Otherwise
ER_Ref	1 = Employer received experience rating premium refund in previous year 0 = Otherwise
ER_Sur	1 = Employer received experience rating premium surcharge in previous year 0 = Otherwise
Union	1 = Unionized workforce 0 = Otherwise
Full_H&S	1 = Employs full-time health and safety staff 0 = Otherwise
Understand	1 = Good to very good understanding of how experience rating program works 0 = Otherwise
Rel_rate	Employers' rate group premium assessment rate divided by average provincial rate
H&S_incent	1 = If employer offers incentives to employees for a good health and safety record 0 = Otherwise
Manuf	1 = If employer is in the manufacturing sector 0 = Otherwise

medium sized employers. A larger proportion of small and large employers than medium sized employers understand how the experience rating program works. A lower percentage of small and medium employers stated that they hired external personnel or consultants to help them deal with experience rating than large employers. The majority of employers expressed support for the continuation of experience rating. This finding is consistent across firm size categories. Finally, about 40 percent of large employers which were subjected to an experience rating premium refund or surcharge reported that they had changed their safety related practices as a result. This result varies directly with firm size category.

TABLE 2
Some Employer Survey Findings

	<i>Employer Size Categories</i>		
	<i>Small (n=217)</i>	<i>Medium (n=142)</i>	<i>Large (n=155)</i>
Of those surveyed:			
— Aware of enrollment in experience rating program	85.7%	86.6%	98.7%
Of those who are aware of enrollment:			
— Understand how the program works	29.6%	24.4%	39.2%
— Hired external personnel/consultants to help deal with program	2.2%	7.3%	10.5%
— Support the continuation of program	66.7%	72.4%	73.9%
— Received premium refund or surcharge	47.3%	40.7%	59.5%
Of those who received a premium refund or surcharge:			
— Changed safety related practices due to program	18.2%	26.0%	40.7%

The results of the multivariate logit modelling exercise are presented in Table 3. We observe that the economic incentives provided to employers by experience rating in the form of premium rebates and surcharges exert a powerful positive influence of the likelihood of change in safety behaviour. Employers subjected to an experience rating premium refund (surcharge) were 20.9 percent (17.6 percent) more likely to report changes in their safety

TABLE 3

**Logit Model Estimates of the Probability of Change in Employer Safety Practices
(Change_S)**

<i>Variable Name</i>	<i>Mean and Std. Dev.</i>	<i>Logit Model Coefficients</i>	<i>Change in Probability</i>
Constant	—	-3.672* (7.75)	—
ER_Ref	0.369 0.483	1.031* (3.38)	0.209
ER_Sur	0.129 0.336	0.893* (2.26)	0.176
Medium	0.265 0.442	0.607** (1.68)	0.112
Large	0.330 0.471	1.361* (3.47)	0.290
Length	3.022 1.280	0.222** (1.72)	0.035
Union	0.302 0.460	-0.631** (1.86)	-0.081
Full_H&S	0.213 0.410	0.886* (2.99)	0.175
Understand	0.315 0.465	0.740* (2.82)	0.141
Rel_rate	1.330 1.031	-0.029 (0.20)	-0.005
H&S_incent	0.252 0.435	0.301 (1.03)	0.051
Manuf	0.306 0.461	-0.321 (1.12)	-0.045

Restricted (slopes = 0) Log-Likelihood = 456.50

Log-Likelihood = 387.26, Chi-Square for covariates = 69.24 with 11 d.f. (p = 0.0001)

Hosmer and Lemeshow goodness-of-fit statistic = 5.505 with 8 d.f. (p = 0.703), Sample Size = 464, Mean of dependent variable = 0.194

Notes: Absolute values of asymptotic t-statistic shown in parenthesis.

Change in probability evaluated at sample mean P = 0.194.

* Significant at the 5 percent level (two-tailed test).

** Significant at the 10 percent level (two-tailed test).

practices than firms who have not been subjected to the experience rating stimulus.⁶

There is a positive and statistically significant relationship between the employment of full-time health and safety personnel by a firm and the probability of a change in its safety practices. Employers that have full-time health and safety staff are almost 18 percent more likely to alter their safety related behaviours in response to experience rating.

Employers with a good or very good understanding of how the experience rating mechanism operates have a significantly higher likelihood of altering their safety related practices than those who do not. Given this positive relationship between employer understanding of experience rating and the probability of response in behaviour may lead one to conclude that the rate setting agency should simplify the relationship between premiums and accident performance. Most experience rating formulas consist of an array of actuarially relevant relationships and calculations that are beyond the comprehension of most decision makers (especially within small firms) and many health and safety professionals.

Relative to small firms, larger employers are more likely to alter their safety practices in response to experience rating. The estimated model parameters indicate that the longer a firm has been enrolled in the experience rating program the more likely it is to change its safety behaviour as a result. Finally, employers with a unionized workforce are less likely to change their safety behaviour in response to experience rating than those with non-unionized workers.

⁶ In these types of models the change in the probability of a firm changing its safety practices emanating from a unit change in an explanatory variable can be calculated as $\partial P/\partial X = P(1-P)\beta$. That is, the estimated logit coefficients, β , can be converted to changes in probabilities, $\partial P/\partial X$ by multiplying them by $P(1-P)$. Rewriting the logit as $P = \exp(X'\beta)/[1 + \exp(X'\beta)]$ and taking the partial derivative yield

$$\partial P/\partial X = \exp(X'\beta)\beta/[1 + \exp(X'\beta)]^2.$$

Since $1-P = 1/[1 + \exp(X'\beta)]$, therefore $\partial P/\partial X = P(1-P)\beta$.

However, this above result is strictly true only for small changes in X . For larger changes, as is the case with discrete changes associated with dummy independent variables, it is necessary to incorporate the discrete change into the logistic function. That is, since

$$P = [1 - \exp(-X'\beta)]^{-1}, \text{ then } P + \Delta P_i = [1 + \exp(-X'\beta - \beta_i \Delta X_i)]^{-1},$$

where ΔP_i is the change in the probability of an employer altering his safety related practices due to experience rating associated with a unit change in the explanatory variable, X_i (i.e. $\Delta X_i = 1$), and where β_i is the estimated logit coefficient associated with the variable X_i . Since $\Delta X_i = 1$, then this reduces to

$$P + \Delta P_i = [1 + \exp(-X'\beta - \beta_i)]^{-1}$$

therefore $\Delta P_i = [1 + \exp(-X'\beta - \beta_i)]^{-1} - P$. This computation is facilitated by the fact that, since $P/(1-P) = \exp(X'\beta)$, then $\ln[P/(1-P)] = X'\beta$. Thus ΔP_i above can be calculated from the logit coefficients, β_i , and a value of P that implies a corresponding value for $X'\beta$.

Case study findings are summarized in tabular form in Table 4. Experience rating appears to have increased employer awareness of workers' compensation claim costs and the need to focus responsibility for these costs in the area of workplace safety and accident prevention. Experience rating has resulted in a sizeable incremental impact on health and safety initiatives of about 20 and 40 percent by employers in areas related to accident prevention.

TABLE 4

Employer Responses to Experience Rating, Results of Case Studies (N = 35)

	<i>Total Number</i>	<i>Number Due to Experience Rating*</i>
Accident Prevention Activities		
— Focus on safety training	21	9 [43]
— Focus on worker protection	22	4 [18]
— Focus on safety promotion	23	8 [35]
Post-Injury Activities		
1. Severity Reduction		
— Provision of rehabilitation program for injured workers	12	4 [33]
— Provision of modified/light duty work to injured workers	30	21 [70]
— Provision of re-training to injured workers	6	2 [33]
2. Claims Management		
— Focus on claim cost control	27	26 [96]
— Track/Monitor injuries	30	16 [53]
— Contest/Appeal claims	28	13 [46]
— Request SIEF relief	23	11 [48]
— In-house medical treatment facilities	20	4 [20]

Notes: * Percentage of total shown in square parenthesis

A large percentage of case study firms place an emphasis or focus on controlling claim costs. Experience rating has led to an increased employer focus on claim cost control in virtually all of these firms (96 per cent). The incidence of various claim cost control activities such as claims monitoring, appeals and SIEF transfers is quite high. The incremental impact of experience rating on claims management varies, but is generally higher than the incremental impact of experience rating on accident prevention activities. In addition

to actually contesting claims, some employers use a number of techniques to draw specific claims to the attention of WCB adjudicators. The employer's motivation is that they feel that the claim may not be legitimate and that the WCB adjudicator will come to this conclusion independently, if they focus attention on his specific claim. Examples of this include talking to adjudicators and raising issues, without formally contesting the claim, failing to complete the Employer's Report of Injury/Disease (Form 7) properly, so that it requires special attention and maintaining good documentation of suspicious claims and immediately reporting these suspicions to the WCB.

There is relatively lower incidence as well as incrementality in provision of rehabilitation and retraining programs for injured workers as a result of experience rating. However, modified work or light duty programs are an exception.

It appears that a good deal of claims management activity is motivated by the experience rating incentive to minimize the number of claims reported to the WCB, and, for any reported claim, to minimize its duration or cost. The existence of claims cost reserve factors and WCB overheads means that the cost of claims, as reflected in the experience rating calculations, appears very substantial to firms, particularly for minor claims (i.e. short duration temporary total disability claims). The case studies lead to the view that much claims management activity is directed at these minor claims. The focus on these types of claims is due to the fact that, in the employers' view, it is actually cheaper to incur certain costs, rather than to have them paid by the WCB. Examples include the provision of on-site health care facilities and short term modified work at full pay, rather than have injured workers seek benefits from the WCB. The model used by firms is in some ways analogous to that used by automobile owners with respect to their auto insurance. While a claim for a minor accident may be eligible for reimbursement, the ultimate long-term impact on their insurance cost of making such a claim exceeds the benefits realized by making the claim. For example, it may result in higher rates which more than offset the magnitude of the claim. In this case, the automobile owner tends to use his insurance policy to deal with the larger and higher cost accidents, and may deal with the minor events directly. The existence of experience rating provides similar incentives to employers, and it is clear that a number respond in the same way.

CONCLUDING REMARKS

Unlike previous research which has focused on impacts on the final outcome measures, primarily accident frequency rates, and which has provided few convincing conclusions on the efficacy of experience rating, the present

study indicates that there is a noticeable incremental effect on intermediate safety behaviours by employers. The empirical findings suggest that workers' compensation insurance experience rating affects a broad spectrum of firm behaviours, not only those pertaining to accident prevention and frequency rates.

Firms may undertake strategies that can improve their accident record and benefit from experience rating without allocating their resources to accident prevention activities. Claims cost containment strategies for accidents that do occur may be more economical than activities aimed at frequency reduction. The present study, which employs Canadian data, indicates that this is in fact the case, employers are altering their safety practices in response to the financial incentives provided by experience rating. However, they are also allocating significant resources to post-injury claims cost control rather than just to accident prevention. Therefore, it is not surprising that past studies looking solely at accident frequency rates have not found much impact especially at the aggregate industry level.

Further micro level studies employing surveys and case studies should be encouraged because they, unlike aggregate data on final outcome measures, can tell us how and/or why certain patterns in aggregate data are occurring. If for example, in the aggregate accident frequency rates are lower for experience rated firms relative to non experience rated firms it is important from a public policy view to ascertain how this is occurring. Are they lower because experience rated employers have implemented safer production procedures, health and safety training, provided more safety equipment, etc. or is it due to non-reporting or suppression of claims? Future studies should put less emphasis on accident frequency and concentrate more on measuring the effect, if any, of experience rating on the intermediate behaviours mentioned previously.

APPENDIX

Ontario Experience Rating Programs

In Ontario about seventy percent of employers are in industries that are experience rated. In 1991, the Ontario Workers' Compensation Board (WCB) had three experience rating programs in operation for different industry groups: New Experimental Experience Rating (NEER) program, Council's Amended Draft #7 (CAD-7) program and the Voluntary program (VER).

The NEER program provides for a premium refund or a surcharge based upon the difference between a firm's actual and expected claims costs, adjusted by a rating factor (RF) which ranges between 0.1 and 0.8 and varies directly by the size of the employer. A very small employer would receive (pay) 10 percent of the difference, graduated upward to 80 percent for the

largest firms. Thus, the smaller the employer, the closer NEER approximates a more traditional collective liability insurance scheme. The formula which determines the amount of the premium refund or surcharge is given by:

$$\text{Refund/Surcharge} = \text{RF} \times [\text{Actual claims costs} - \text{Expected claims costs}]$$

The actual cost for an individual claim includes the payments made for items such as health care and temporary compensation. It also includes an overhead charge and, in most cases, provision is made for possible future costs on the claim. A claim cost calculation takes into account information such as the type of compensation claim involved, the age of the claim, and so on. Then, drawing on its past experience with respect to the maturing of claims costs following the date of injury (the lifetime cost), the WCB estimates what the actual cost of the claim will be. The costs relating to long latency industrial disease claims and costs that result from a prior condition or injury are excluded for experience rating purposes since they are not considered within the employer's control.

The methods for determining expected claims costs under NEER are essentially the same as those for actual claims costs. Expected claims costs are calculated for each firm taking into account the average past accident experience for firms of comparable size within the rate group. Expected claims costs also exclude those components which relate to costs not considered reasonably within a firm's control — charges relating to prior conditions, payment to reduce the unfunded liability and costs of long latency diseases.

As of 1990 the following industries were covered by the NEER program: woods operations, sawmills, veneer mills, pulp and paper mills, mixed mining, petroleum, rubber, trucking, health care, chemicals, plastics, textiles, knitting and spinning, gas wells, abattoirs, hotels and motels, restaurants, steel, foundries, canneries, specialized farming, general farming, paint and varnish, milling and grain elevators.

The NEER program is one of the most aggressive experience rating programs in Canada in terms of the magnitude of the financial incentives (premium refunds and surcharges) it provides. The maximum refunds and surcharges under the NEER program are 80 per cent and 160 per cent, respectively, of an employer's basic assessment premium. As a comparison, under Alberta's experience rating program the maximum refunds are substantially less at 40 per cent of the base assessment premium.

CAD-7 applies specifically to the eleven rate groups in the construction sector. The eleven industries are as follows: road builders, sidewalks, sewers, tunnelling, steel erection, heavy installation, breakwaters and canals, general construction, wrecking, mechanical and electrical contractors, and painting and decorating. It provides assessment premium refunds and surcharges based

on a combination of accident frequency rates and accident costs (equal weighting is given to each). CAD-7 has been in operation since 1984.

The Voluntary program, which has been in existence since 1953, compares a firm's accident cost rate (costs divided by payroll) against the rate group average and refunds or surcharges twenty-five percent of the difference. This program is relatively weak in terms of providing large employers with meaningful financial incentives. Between 1984 and 1989, eleven rate groups originally enrolled in the Voluntary program had subsequently opted to participate in the more aggressive NEER program. As of January 1, 1992 the Voluntary Program has been terminated and the industries enrolled in it were transferred to NEER.

Table 5 provides a comparison of the basic features of Ontario's experience rating programs.

TABLE 5
Comparison of Experience Rating Programs in Ontario (1989)

	<i>Program</i>		
	<i>NEER</i>	<i>CAD-7</i>	<i>VER</i>
Size of Plans			
Set-up Year	1984	1984	1953
Number of Rate Groups	22	11	28
Percent of Employers	22	22	23
Percent of Assessments	28	19	32
Percent of Employees	28	6	32
Financial Power of Plans			
Financial Impact (\$ Mill)*	122	54	50
Average Rebate (\$)	1,885	1,800	1,360
Average Surcharge (\$)	16,570	2,130	5,625
Percent of employers receiving a rebate	88	76	80
<i>Maximum Adjustments: **</i>			
— For Small Firms			
— Rebate	10	9	8.7
— Surcharge	20	18	91.8
— For Large Firms			
— Rebate	80	60	8.7
— Surcharge	160	120	91.8

Notes: * Sum of premium rebates and surcharges
** Percentage of basic assessment premium

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La tarification par incidence — réactions des employeurs

La tarification par incidence vise principalement à améliorer la santé et la sécurité dans le lieu de travail en offrant aux employeurs des stimulants financiers significatifs les incitant à adopter des mesures de prévention des accidents et à faciliter la réadaptation et le rengagement possible des travailleurs blessés. La tarification par incidence vise également à faire en sorte que l'ensemble des cotisations soient réparties de façon plus équitable entre les employeurs. Les incitatifs financiers offerts sous forme de rabais et de surcharges dans le cadre de la tarification par incidence devraient amener les directeurs d'entreprises à adopter des pratiques et des stratégies visant à améliorer la sécurité en portant une attention particulière au bilan de sécurité et en le comparant à la moyenne de l'industrie. Au fil des ans, ces pratiques devraient avoir une incidence sur les mesures de rendement définitives telles que la fréquence des accidents et la durée des périodes d'indemnisation. Le présent document vérifie l'hypothèse voulant que l'application des principes de la tarification par incidence aux cotisations des employeurs produise des changements précurseurs dans leur comportement en matière de sécurité. Ce document tente également de préciser l'étendue de ces changements.

Les données utilisées dans l'analyse visant à déterminer si la tarification par incidence influe sur les pratiques de sécurité des employeurs ont été tirées d'un sondage téléphonique à échantillonnage au hasard, les entreprises étant réparties selon leur taille. Le sondage a été effectué par la Commission des accidents du travail (CAT) de l'Ontario en 1989, auprès d'environ 500 employeurs participant à la Nouvelle méthode expérimentale de tarification par incidence (NMETI). Les renseignements recueillis lors de ce sondage sont utilisés pour établir la probabilité que l'employeur modifiera ses pratiques de sécurité s'il est exposé aux stimulants financiers offerts par la tarification par incidence. En plus du sondage téléphonique, la Commission a effectué des études de cas détaillées sous forme d'entrevues personnelles auprès de trente-cinq importants employeurs de l'Ontario participant aux méthodes de tarification par incidence NMETI ou CAD-7.

Les résultats d'un tel exercice de modélisation logit à plusieurs variables révèlent que les stimulants financiers, sous forme de rabais de prime ou de surcharges qu'offre aux employeurs la tarification par incidence, augmentent considérablement la probabilité que les entreprises modifient leur comportement en matière de sécurité. De fait, les employeurs bénéficiant d'un rabais de prime découlant de la tarification par incidence et ceux ayant à payer une surcharge avaient respectivement 20,9 % et 17,6 % plus de chances de signaler des modifications dans leurs pratiques de sécurité que ceux n'étant pas exposés à la tarification par incidence.

Il existe un lien positif et significatif du point de vue statistique entre l'embauchage à temps plein de personnel responsable de la santé et de la sécurité dans une entreprise et la probabilité de modifications dans les pratiques de sécurité. En effet, les employeurs qui ont à leur emploi un tel personnel ont presque 18 % plus de chances de modifier leurs comportements en matière de sécurité dans le cadre de la tarification par incidence.

Les employeurs qui comprennent bien ou très bien le fonctionnement de la tarification par incidence seraient beaucoup plus portés à modifier leurs pratiques de sécu-

rité que ceux qui ne le comprennent pas. Étant donné la corrélation positive entre la compréhension des employeurs et la probabilité d'un changement de comportement, on peut conclure que l'organisme qui fixe les taux de cotisation devrait simplifier le lien entre les primes et le rendement en matière d'accidents.

Les gros employeurs ont plus de chances de modifier leurs pratiques de sécurité dans le cadre de la tarification par incidence que les petites entreprises. Selon les paramètres types prévus pour l'étude, plus longue est la période pendant laquelle l'entreprise a été assujettie à la méthode de tarification par incidence, plus il est probable que l'entreprise modifie son comportement en matière de sécurité. Enfin, les employeurs ayant à leur emploi un personnel syndiqué sont moins portés à modifier leur comportement en matière de sécurité que ceux dont le personnel n'est pas syndiqué.

Selon les résultats des études de cas, il apparaît que la tarification par incidence a permis de conscientiser davantage les employeurs relativement aux coûts d'indemnisation et au besoin d'attribuer la responsabilité de ces coûts à la sécurité dans le lieu de travail et à la prévention des accidents. D'ailleurs, la tarification par incidence a eu pour effet d'augmenter de 20 à 40 % les initiatives des employeurs relativement à la santé et à la sécurité dans les domaines touchant la prévention des accidents.

Un pourcentage élevé des entreprises ayant participé à l'étude de cas mettent l'accent sur le contrôle des coûts d'indemnisation. En effet, la tarification par incidence a amené les employeurs à porter une plus grande attention à un tel contrôle dans presque toutes ces entreprises, soit dans 96 % d'entre elles. L'incidence des diverses activités reliées au contrôle des coûts d'indemnisation telles que le suivi des demandes d'indemnisation, les appels et les virements au Fonds de garantie pour travailleurs réintégrés (FGTR) est passablement élevée. L'effet marginal de la tarification par incidence sur la gestion des demandes d'indemnisation varie, mais celui-ci est généralement plus important que l'effet marginal qu'exerce la tarification par incidence sur les activités reliées à la prévention des accidents.

À l'exception des programmes de travail modifié et de travaux légers, la tarification par incidence a des résultats et un apport marginal relativement faibles en ce qui touche la prestation de programmes de réadaptation et de recyclage à l'intention des travailleurs blessés.

Il semble que beaucoup d'activités reliées à la gestion des demandes d'indemnisation découlent de l'objectif de la tarification par incidence qui vise à minimiser le nombre de demandes d'indemnisation présentées à la CAT, et, pour chacune d'elles, à minimiser la durée de la période d'indemnisation et les coûts qui y sont reliés.

Les recherches précédentes ont mis l'accent sur les indicateurs des résultats finaux, principalement sur les taux de fréquence des accidents, et ont fourni peu de conclusions convaincantes sur l'efficacité de la tarification par incidence. La présente étude indique au contraire qu'en matière de sécurité, cette méthode a des effets marginaux remarquables sur les comportements précurseurs des employeurs. Les constatations empiriques portent à croire que la tarification par incidence influe sur de nombreux comportements d'entreprises, et non seulement sur les comportements reliés à la prévention des accidents et aux taux de fréquence des accidents.