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Claims Reporting and Risk Bearing Moral Hazard in Workers' Compensation : The Canadian Context

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Claims Reporting and Risk Bearing Moral Hazard in Workers' Compensation : The Canadian Context*

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Résumé / Abstract

Ce texte explore les mécanismes canadiens d'indemnisations pour accidents du travail en reproduisant avec des données canadiennes l'étude de Butler et Worrall (1991). Ces auteurs furent les premiers à développer un modèle simple pour distinguer deux types de risque moral liés à l'indemnisation des accidents du travail : Le risque lié au comportement préventif et le risque lié à la déclaration d'accidents. Le premier est associé à la tendance des travailleurs de prendre plus de risque lorsque la générosité des indemnisations augmente, alors que le second est associé à leur propension à faire une réclamation lorsqu'ils ont un accident. L'estimation de ces deux types de risque moral, avec des données canadiennes, donne des résultats trés différents de ceux présentés par Butler et Worrall.

This paper explores the Canadian context of workers' compensation (WC) by replicating, with Canadian data, a study carried out by Butler and Worrall (1991). These authors were the first to develop a simple model to separate claims reporting and risk bearing moral hazard in WC. Risk bearing moral hazard reflects the workers' incentive to carry more risk and consequently experience more accidents when benefits rise, while claims reporting moral hazard mirrors workers' incentive to file a claim. The estimation of these two moral hazard effects leads to results quite different with Canadian data than with American data.

Mots Clés : Accidents du travail, indemnisations, risque moral

Keywords : Worplace Accidents, Workers'Compensation, Moral Hazard

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I. Introduction

Since the early eightys, more attention has been devoted to the analysis of the workers' compensation systems and particularly, the study of the effects of benefit levels on safety incentives. This growing interest about workers'compensation is primarily due to the increasing importance of this form of social insurance. In Canada, from 1970 to 1993, there has been an average of 1 million occupational injuries reported each year by the different Workers' Compensation Boards (WBC). In 1993, about $5.2 billion in benefits have been paid out by the WBCs. Given that the cost of occupational injuries has steadily increased in the late twenty years, it is increasingly relevant to evaluate, among other things, the different impacts caused by a change in benefit levels.

The theorical effect of an increase in compensation benefits on the incidence of workplace accidents is ambiguous. On the one hand, if benefits increase, there could be incentives for workers to fill more claims because the cost of being on a claim decreases. On the other hand, the increasing benefits may lead the experience rated firm to induce more safety on the workplace in order to reduce the number of claims being filled, and so, to cut its insurance premium to the WCB. Empirically, a majority of studies have found that an increase in benefits leads to an increase in the reported injury rate[1].

When the benefits rise induce the worker to fill more claims, two types of moral hazard could be implied. The worker could take more job risk and more on-the-job accidents will occur, this is "risk bearing" moral hazard. However, as mentioned above, this effect may be mitigated by firms expanding their resources devoted to safety, so that the net impact on the incidence of injuries may be negative. Furthermore, the worker could fill more claims without taking more risk and so without affecting the actual injuries level, this is "claims reporting" moral hazard. Butler and Worrall (1991) were the first to elaborate a simple method to distinguish these two types of moral hazard. They found that the positive effect due to claims reporting moral hazard more than offsets the negative effect associated with the risk bearing moral hazard. That may explain how workplace safety may be improving over time, while reported claims increase as real benefits increase.

Since these authors have expressed their interest in applying the same method to other data, to confirm the credibility of their approach, we decided to use this approach with Canadian data.

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1 For example, see Worrall and Appel (1982), Butler (1983), Butler and Worrall (1983), Chelius and Kavanaugh (1988) and Krueger (1990).

The Canadian workers'compensation system being fairly different from its American counterpart, we have to mention some of these differences. Firstly, the Canadian systems are more generous with replacement rates of 75 % of gross weekly earning or 90 % of after-tax earnings, comparatively to 66 % of gross weekly earnings in most American states. Secondly, in Canada, workers' compensation is provided by government-operated WCBs, each provincial's board being independent of the others, and the premium-rating procedures are established by government directives, while most WC services are provided by private carriers in the U.S., who establish their own premium-rating structures. As a result, experience rating is more frequent in the United States than in Canada, where most of the industries is nonexperience or flat-rated (see Vaillancourt, 1994). Moreover, in certain important provinces including Quebec, the worker's own physician has to establish the validity of a workplace accident, while in other provinces and in most American states, injured workers are seen by specialized physicians chosen by the board.

In this paper, we attempt to estimate the empirical magnitude of the risk bearing moral hazard and of the claims reporting moral hazard with Canadian data. Our results are very different from those found by Butler and Worrall. We obtain that risk bearing moral hazard influences positively the incidence of injuries, while claims reporting moral hazard have a negative effect. Section II presents briefly the theory on which is based the Butler and Worrall's approach. In section III, we present the data used for this analysis. Section IV discusses the empirical results and section V concludes.

II. The Theory

Even in the absence of moral hazard, it is expected that an increase in the expected indemnity payment will lead to an increase in the expected cost per claim, in a naive actuarial sense, this relationship being one to one. When moral hazard is present this relationship is complicated by the presence of claims reporting and risk bearing moral hazards. The approach developed by Butler and Worrall (1991) distinguishes the latter two effects.

Their approach is based principally on two assumptions. Firstly, in the absence of moral hazard, the expected benefits must predict actual average indemnity costs perfectly. When the expected benefits are calculated as to correspond to the indemnity payments for a typical worker and assuming the frequency and severity of claims is unchanged, the expected benefits should exactly reflect average costs per worker. So, that method of computing benefits would allow the separation of the actuarial and moral hazard effects.

Secondly, they assume that tendencies in real medical costs represent total medical damages associated with compensable workplace injuries, since workers' compensation pays for practically unlimited medical care. In this case, the relevant element is to correctly deflate the medical costs so that they could account for the higher costs of medical care. In fact, in absence of claims reporting moral hazard, the impact of expected benefits should be similar on total indemnity and medical costs, when the latters are properly deflated.

In algebric terms, the model developed by Butler and Worrall is the following[2]:

$$\ln(I/\tau) = \alpha_0 + \alpha_1 \ln(B/\tau) + \alpha_2 X \quad (1a)$$

$$\ln(M/\pi) = \beta_0 + \beta_1 \ln(B/\tau) + \beta_2 X \quad (1b)$$

where I = expected indemnity costs per worker, M = expected medical costs per worker, B = weekly indemnity amount, π = price of medical care per week per worker, τ = consumer price index and X = is a vector other control variables (to be defined below).

From the results of the preceding multiple regressions, the claims reporting and risk bearing moral hazard elasticities can be derived according to the following:

$$\epsilon_r = \beta_1 \ ; \ \epsilon_n = \alpha_1 - \beta_1 - 1 \quad (2)$$

where ϵ_r = risk (real) bearing moral hazard elasticity and ϵ_n = claims (nominal) reporting moral hazard elasticity. The intuitive arguments behind these results can be stated as follows. First, the change in the workplace riskiness due to risk bearing moral hazard is captured entirely by the effect of expected benefits on average medical cost per worker. Second, claims reporting moral hazard can be deduced once one has accounted for risk bearing moral hazard, and for the actuarial relationship between changes in indemnity payments and changes in average claim costs (a one-to-one relationship).

III. Data used in the Analysis

The analysis is based upon pooled time-series and cross-section data. The period covered in this paper goes from 1975 to 1992 inclusively, for the ten Canadian provinces. Hence, the sample contains 180 observations. The data were found in three

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2 For the model derivation and more explanations, see Butler and Worrall (1991).

principal sources: Annual Reports of the different WCBs, publications of The Association of Workers Compensation Boards of Canada (AWCBC) and of Statistics Canada[3].

Indemnity costs (I)[4] have first been deflated by the general consumer price index (CPI; 1986 = 100), while medical costs (M)[5] have been deflated by an index based on average total expenses per hospitalization day (Index; 1986=100). Secondly, these costs were divided by the employment variable that consists in total employment, including nonagricultural employment (which is covered by WCBs in Canada for a few years) and government employment (whose costs are included in the indemnity and medical costs[6]). Figure 1 provides the trends for these two variables.

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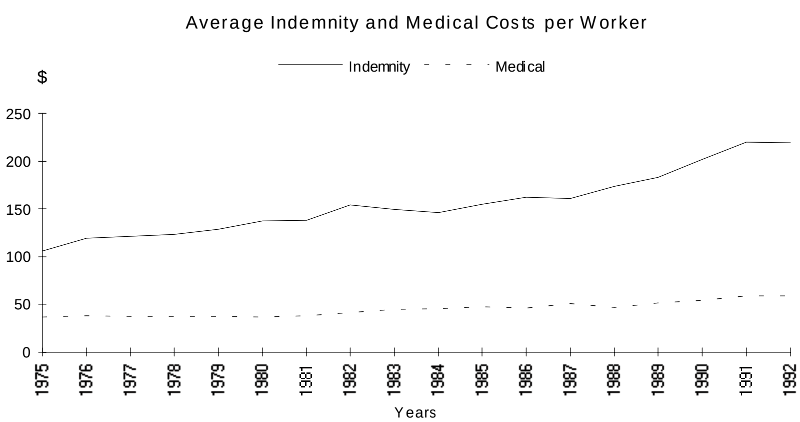
3 Several difficulties had been encountered while constructing the sample data. Among them, the different definitions (for medical aid, rehabilitation and compensation) used in the ten provinces, and even in one province over time. So, these definitions had sometimes been modified in order to be conciliated. The definitions employed in every WCB may be dissimilar because each WCB is a totally different entity. However, since the beginning of the 90's, there had been tendencies to bring some homogeneity in the different Occupational Safety and Health Administrations. Furthermore, another problem consisted of the non availability of certain annual data, and gaps had to be filled using standard techniques.

4 Indemnity costs include payments paid for temporary and permanent disabilities and pensions.

5 Medical costs include costs for medical aid and for rehabilitation.

6 The indemnity and medical costs used in this analysis include costs paid by the WCBs for the employers who pay assessment to the boards and also the costs paid by the employers who self-insured (principally government employers).

Figure 3


Average Indemnity and Medical Costs per Worker
Indemnity
Medical
$
250
200
150
100
50
0
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
Years

Two different measures of benefits were used in the models: the expected benefit and maximum benefit payments. The expected benefit payments were computed according to the method developed by Butler (1983). This method gives an estimation of the indemnity payments for a typical worker given a province's replacement rate, its minimum and maximum benefits, and the wage distribution of its workers[7].

Butler and Worrall employed the proportion of insurance dollars that self insure and its value square (P and PSQ) as sample selection corrections in all their models, because their data did not include information about the firms that qualify for self-insurance. Even if the data on which is based this analysis takes account of the self-insured employers, so that there is no need for sample selection corrections, these two variables were also utilized to take account for the effect of self-insuring on the indemnity and medical care costs.

The models include a variable (RR dummy) that accounts for the change in the replacement rate regime, when the replacement rate changed from 75 % of gross income to 90 % of net income[8]. This variable is interacted with the benefit variable as it is assumed that the change in the compensation basis leads to a more generous system, this change is likely to correspond to an increase in the indemnity costs.

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7 So, the expected benefit variable (EXPBEN) is the sum of the proportion of workers receiving the minimum payment (MINCOM) times MINCOM, the proportion of workers receiving the maximum payment (MAXCOM) times MAXCOM, and the proportion between these borders times their average benefits. The computation of this variable was complicated by the distinct income basis used with the nominal percentage compensation (NPC), in the different WCBs, some provinces using 75 % of the gross income and others using 90 % of the net income. So, when necessary, the gross income amounts corresponding to 90 % of the net income were calculated, which means taking account of the different provincial taxation systems.

8 Quebec's board was the first to change its replacement rate system, in 1979. In 1994, there are still three provinces using the 75 % of gross income as nominal wage compensation: Prince-Edward-Island, Nova Scotia and British Columbia. It is also noteworthy that the province of Manitoba changed for 90 % of net income only in 1992, so that the Manitoba data cannot reflect this change.

The last variable used in the analysis is one that takes account for the proportion of risky jobs (employment in the primary sector, the construction, manufacturing and transportation industries) in each province.

IV. Results

The model has been estimated using ordinary least squares, with the two different measures of benefits[9]. The results are produced in Table 1. Following Butler and Worrall (1991), Panel A presents results employing the expected benefit payments measure and Panel B, those using maximum payments measure.

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[9] The estimations presented here are those considered as most representative and comparable with Butler and Worrall, although a large set of estimations were performed. Firstly, we tried the Kmenta pooling method instead of the OLS method. Secondly, we used another measure of benefits, the average benefit. This measure proved to be interesting, the estimations being even a little more significant than with the expected benefit measure, but the nature of the results was not altered.

Thirdly, we used two different definitions for medical and indemnity costs. For medical costs variables, one variable definition included only medical aid costs, while the other encompassed medical aid and rehabilitation costs. For indemnity costs variables, one variable was indemnity costs for temporary disability only, whereas the other one was the total indemnity costs. Again ,the nature of the results presented here was not altered by these changes.

Finally, we used two different definitions for the risky jobs variable, one with only jobs relative to construction and manufacture industries and the other less restrictive with jobs relative to construction and manufacturing industries, but also to transportation industries and primary sectors.

INSERT TABLE 1 HERE

It is noteworthy that results using Canadian data are quite different from those obtained by Butler and Worrall with American data. That divergence exists was suggested by the steady or slightly increasing trend of medical costs, see Figure 1, whereas American medical costs shown a downward tendency. This weak ascending trend is probably related to the positive sign obtained for the log(medical costs) estimates (α_1), which implies a positive sign for the risk bearing moral hazard elasticity. This is our first important difference from Butler and Worrall who have a negative estimate. Recall that their result implied that the reduction in workers'accident-prevention actions due to better benefits was more than offset by firms'safety investments or, in other words, that employers'responses were stronger than employees'responses.

This result is not necessarily surprising given the differences we described between the Canadian and American WC systems. First, more generous WC benefits in Canada may induce less care by Canadian workers, while more rudimentary experience rating mechanisms in Canada may also provide firms with less incentives for safety. So that, overall, more generous WC payments may be associated with more risk in the workplace as we find.

Our second divergence with Butler and Worrall is that the magnitude of our benefit coefficients (β_1) are much smaller than theirs. In fact, none of them is greater than 1. For instance, the benefit coefficient in the first regression indicates that a 10 percent increase in expected benefits leads to a 5.6 percent increase in per worker indemnity costs. This coefficient, combined with the actuarial relationship described above and the "risk bearing moral hazard elasticity", leads to a "claims reporting moral hazard elasticity" of -0.58. Table 2 presents the different estimated "moral hazard" elasticities.

Table 2

Claims Reporting and Risk Bearing Moral Hazard Elasticities

Overall Moral Hazard ($\epsilon_n + \epsilon_r$)	Claims Reporting Moral Hazard (ϵ_n)	Risk Bearing Moral Hazard (ϵ_r)
-0.44265	-0.58371	0.14106

This counter-intuitive result is puzzling. A priori, there is no theoretical reason as to why the "claims reporting moral hazard" elasticity would be negative. This may have to do with the way we defined the variables at stake here: 1) the average indemnity cost and 2) the expected benefits. Indeed, the average indemnity cost may be varying because the denominator (employment) is changing. In particular, at the end of the period under study, the recession has entailed a shrinking of employment, which, ceteris paribus, has resulted in an increase of the average indemnity cost, not necessarily related to workers'behavior toward workers'compensation. Similarly, the definition of the expected benefit variable (see footnote 7) relies partly on the portions of the labour force entitled to the maximum, minimum or average indemnity payment; so that a change in this variable may be due to a change in the wage distribution and not in the intrinsic generosity of WC regimes. Examination of the data shows that there was a decline in the proportion of workers receiving the maximum insurable income. As a consequence, the expected benefit variable is decreasing through time, so that the weaker relation we find between expected benefits and average indemnity cost is not implausible. Therefore, given these definitions, our results suggest that we may not be capturing entirely the phenomenon of interest, i.e., the relation between the generosity of WC and the incidence of claims. Furthermore, Fortin and Lanoie (1992) have shown that, at least in Canada, ignoring the generosity of unemployment insurance (UI) may bias the estimate of the relation between the generosity of WC and the incidence of job riskiness. Indeed, given that WC is much more generous in Canada than UI, workers heading to their dismissal may be tempted to take actions to benefit from WC instead of UI. Ignoring this fact may lead WC coefficients to be biased downward[10].

Concerning the regressions using maximum benefits, the impact on indemnity costs was expected to be smaller for maximum than for expected benefits, since maximum benefits do not mirror indemnity costs as well as do expected benefits. This is what we observe, coefficients relative to maximum benefits are consistently smaller than those relative to expected benefits, but show the same sign.

V. Conclusion

This paper has been exploring the Canadian context of workers' compensation and has been particularly focusing on the estimation of moral hazard effects. One of the major interest of this paper was to replicate, with Canadian data, a study carried out by Butler and Worrall (1991). Those authors have developed a simple model to separate claims reporting and risk bearing moral hazard in workers' compensation. Risk bearing moral hazard reflects the worker incentive to carry more

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[10] Indeed, Fortin and Lanoie (1992) show that, when they withdraw the variable related to the generosity of UI in their regressions, the coefficient of the WC variable is substantially reduced, which is plausible given the positive correlation between the generosity of the two regimes.

risk and consequently experienced more accidents when benefits rise, while claims reporting moral hazard mirrors worker incentive to file a claim.

The estimation of these two moral hazard effects leads to results quite different with Canadian data than with American data. Part of this may be due to institutional differences between the two countries (generosity of WC, extent of experience rating), while weaknesses in the methodology and in the definitions used may explain the rest of the difference. Further research with micro data would be required to provide more insights on these issues.

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Table 1

"Moral Hazard": Indemnity and Medical Cost, 1975-1992
(statistique -t)

Independant Variables	PANEL A				PANEL B			
	Using Expected Payments				Using Maximum Payments			
	log (indemn. costs)		log (medical costs)		log (indemn. costs)		log (medical costs)	
Intercept	0.75327 (0.6333)	0.74435 (0.6405)	2.1151 (1.329)	2.0991 (1.379)	1.4457 (1.993)	1.9724 (2.578)	-1.4774 (-1.603)	-0.43418 (-0.4546)
Expected benefits	0.55735 (2.649)	0.59175 (2.874)	0.14106 (0.5008)	0.20271 (0.7515)	-	-	-	-
(Exp. ben.)× (RR dummy)	-	0.027489 (2.973)	-	0.049257 (4.068)	-	-	-	-
Maximum Benefits	-	-	-	-	0.43709 (3.421)	0.36608 (2.785)	0.78663 (4.845)	0.64597 (3.937)
(Max. ben.)× (RR dummy)	-	-	-	-	-	0.017377 (2.011)	-	0.03442 (3.192)
LPOPRISK	-2.2858 (-11.59)	-1.8107 (-7.232)	-1.2730 (-4.820)	-0.42173 (-1.286)	-1.9139 (-8.906)	-1.6296 (-6.376)	-0.68607 (-2.512)	-0.12289 (-0.3852)
PSELINS (Prob. self ins.)	3.9733 (2.963)	4.3695 (3.318)	0.43841 (0.2443)	1.1484 (0.6657)	4.4468 (3.340)	4.6438 (3.510)	1.3524 (0.7993)	1.7426 (1.055)
$PSELINS^2$ $(Prob. self ins.)^2$	-8.5172 (-2.551)	-9.1083 (-2.787)	0.43643 (0.09765)	-0.62286 (-0.1455)	-8.6479 (-2.625)	-8.9653 (-2.743)	-0.43528 (-0.1040)	-1.0639 (-0.2607)
Ont	-0.29881 (-3.346)	-0.27914 (-3.189)	-0.03812 (-0.3188)	-0.00287 (-0.02504)	-0.26363 (-3.130)	-0.23950 (-2.840)	-0.093696 (-0.8754)	-0.0459 (-0.4361)
Man	-1.4344 (-11.83)	-1.2993 (-10.24)	-0.40057 (-2.467)	-0.15847 (-0.953)	-1.4511 (-12.12)	-1.3557 (-10.61)	-0.42826 (-2.814)	-0.23922 (-1.499)
	Sask	-0.70111 (-9.015)	-0.20441 (-2.135)	-0.02258 (-0.2216)	-0.86961 (-12.36)	-0.79716 (-10.16)	-0.27619 (-3.089)	-0.13269 (-1.355)
Alb	-0.65880 (-8.523)	-0.57376 (-7.104)	-0.03939 (-0.3807)	0.11299 (1.068)	-0.60892 (-8.269)	-0.54731 (-6.916)	-0.03220 (-0.3442)	0.08983 (0.9094)
CB	-0.63379 (-6.705)	-0.48278 (-4.580)	0.07355 (0.5813)	0.34415 (2.492)	-0.56893 (-6.686)	-0.45285 (-4.432)	0.023292 (0.2154)	0.25323 (1.985)
NB	-0.86348 (-8.750)	-0.85233 (-8.832)	0.16676 (1.262)	0.18673 (1.477)	-0.89241 (-9.280)	-0.88912 (-9.329)	0.18018 (1.474)	0.18671 (1.569)
NE	-0.89638 (-4.865)	-0.80180 (-4.385)	-0.53392 (-2.165)	-0.36444 (-1.522)	-0.97554 (-5.450)	-0.91577 (-5.092)	-0.54371 (-2.390)	-0.42532 (-1.895)
IPE	-1.5906 (-11.22)	-1.3974 (-9.130)	-0.51764 (-2.727)	-0.17137 (-0.8548)	-1.5836 (-11.80)	-1.4884 (-10.54)	-0.22258 (-1.305)	-0.03398 (-0.1928)
TN	-0.23434 (-2.870)	-0.24037 (-3.012)	0.35487 (3.247)	0.34406 (3.291)	-0.38122 (-4.752)	-0.37894 (-4.766)	0.19303 (1.894)	0.19754 (1.990)
R^2	0.7699	0.7803	0.3777	0.4310	0.7760	0.7800	0.4540	0.4826