



## Original Article

# Unions, Health and Safety Committees, and Workplace Accidents in the Korean Manufacturing Sector

Woo-Yung Kim<sup>1</sup>, Hm-Hak Cho<sup>2,\*</sup><sup>1</sup> Faculty of Economics and Trade, Kongju National University, Gongju, Republic of Korea<sup>2</sup> Republic of Korea Occupational Safety and Health Agency, Republic of Korea

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## ABSTRACT

**Background:** Despite the declining trend of workplace accidents in Republic of Korea, its level is still quite high compared with that in other developed countries. Factors that are responsible for high workplace accidents have not been well documented in Republic of Korea. The main purpose of this paper is to estimate the effects of unions and health and safety committees on workplace accidents in Korean manufacturing firms. We also allow for the interactions between unions and health and safety committees in the analysis. The results obtained in this paper will not only contribute to the literature in this field, but might also be useful for employers and worker representatives who are trying to find an effective way to reduce workplace accidents.

**Methods:** This paper utilizes the 2012 Occupational Safety and Health Trend Survey data, which is a unique data set providing information on workplace injuries and illness as well as other characteristics of participatory firms, representative of the manufacturing industry in Republic of Korea.

**Results:** In estimating the effects of unions and health and safety committees, we build a negative binomial regression model in which the interactions between unions and health and safety committees are permissible in reducing workplace accidents.

**Conclusion:** Health and safety committees were found to reduce the incidence of accidents whereas unionized establishments have higher incidence of accidents than nonunionized establishments. We also found that health and safety committees can more effectively reduce accidents in nonunionized establishments. By contrast, nonexclusive joint committees can more effectively reduce accidents in unionized establishments.

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## 1. Introduction

Despite the declining trend of workplace accidents in Republic of Korea, its level is still quite high compared with that observed in other developed countries. For example, in 2011 the work-related fatality rate of Republic of Korea was 13 per 100,000 workers, which sharply contrasts with 3.5 for the United States and 0.6 for the United Kingdom [1]. Even compared with countries with a similar-size GDP (gross domestic product) such as Australia and Mexico, the Korean fatality rate in 2011 was still much higher, with Australia's and Mexico's, respectively, being 2.0 and 10.5 per 100,000 workers [1].

Factors that are responsible for high workplace accidents, however, have not been well documented in Republic of Korea. In particular, the roles of unions and workplace institutions such as health and safety committees have not been studied much in reducing workplace accidents in Republic of Korea. Often, unions and health and safety committees are believed to increase the workplace safety level more effectively than any government efforts because they can better identify the level of risk involved in jobs and share information about how to organize work in reducing the incidence of accidents.

Unfortunately, there is no consensus on the impact of unions and health and safety committees on workplace accidents. By

\* Corresponding author. Safety and Health Policy Research Department, KOSHA, 400, Jongga-ro, Jung-gu, Ulsan, 44429, Republic of Korea.  
 E-mail address: [hmhak@kosha.or.kr](mailto:hmhak@kosha.or.kr) (H.-H. Cho).

examining coal mining industries, Boal [2], Garen [3], and Wallace [4] found that unions increased the workplace safety level, leading to a lower accident rate. By contrast, Fenn and Ashby [5] and Donado [6] provided evidence—contrary to the general belief—that firms with a higher proportion of unionized workers are associated with a higher number of workplace accidents. Taking a different avenue, Reilly et al [7] examined the interaction effects of unions and health and safety committees on workplace accidents. They found that health and safety committees reduced workplace injuries more significantly when employee representatives are appointed by unions. Their results, therefore, indicate the importance of effective interactions between unions and health and safety committees in workplaces.

The main purpose of this paper is to estimate the effects of unions and health and safety committees on workplace accidents of Korean manufacturing firms. To achieve the goal, this paper utilizes the 2012 Occupational Safety and Health Trend Survey data, which is a unique data set providing information on workplace injuries and illness as well as other characteristics of manufacturing firms in Republic of Korea. In estimating the effects of unions and health and safety committees, we build a negative binomial regression model in which the interactions between unions and health and safety committees are allowed in reducing workplace accidents. The results obtained in this paper will not only contribute to the literature in this field, but will also be useful for employers and worker representatives who are trying to find an effective way to reduce workplace accidents.

## 2. Materials and methods

### 2.1. 2012 Occupational Safety and Health Trend Survey data

In order to estimate the effects of union and health and safety committees, we used the 2012 Occupational Safety and Health Trend Survey data, which were collected and released by the Occupational Safety and Health Research Institute of the Republic of Korea Occupational Health and Safety Agency. The data set was constructed in the pursuit of providing information on the health and safety conditions of Korean establishments in order to develop proper health and safety policies at governmental as well as at firm level. A sample of 3,000 establishments (with five or more workers) in manufacturing industries and 3,000 establishments in service industries were randomly selected to represent the Korean manufacturing and service sectors, respectively. The survey contains information on health and safety education and training, union status, health and safety organizations and committees, number of accidents as well as employment characteristics of establishments. Because of a low incidence of workplace accidents in the service sector, our analysis focused on the 3,000 establishments from the manufacturing sector.

### 2.2. Negative binomial regression model

Our statistical model was a negative binomial regression model. The model can be used for overdispersed count data when the conditional variance exceeds the conditional mean [8]. It can be considered as a generalization of Poisson regression in which the unobserved heterogeneity of an establishment is included and assumed to distribute following a gamma function. Our model was very similar to the one adopted by Fenn and Ashby [5], who examined the relationship between union density and workplace accidents. The estimation of our model was done with the maximum likelihood method using Stata version 13.

### 2.3. Variables

All variables were measured at the establishment level in 2012. The following are the descriptions of dependent and independent variables:

#### Dependent variable

- *Accident*: the number of accidents (injuries and illness) that occurred

#### Independent variables

- $\ln(emp)$ : the natural logarithm of the total number of employees at the establishment
- *Office*: the share of office workers
- *Female*: the share of female workers
- *Older*: the share of workers aged 55 years or older
- *Foreign*: the share of foreign workers
- *Weekhr*: a categorical variable for the weekly hours of work; *Weekhr* = 1 if fewer than 40 hours; *Weekhr* = 2 if as many as 40 and fewer than 50; *Weekhr* = 3 if as many as 50 and fewer than 60; *Weekhr* = 4 if as many as 60 hours
- *Salesperwkr*: the amount of sales per worker (million Korean won)
- *Union*: a dummy variable, which equal is to 1 if there exists a union; 0 otherwise.
- *Hscommittee1*: a dummy variable, which is equal to 1 if there exists an exclusive health and safety committee; 0 otherwise
- *Hscommittee2*: a dummy variable, which is equal to 1 if there is no exclusive health and safety committee, but where a joint committee exists, dealing with health and safety issues and other matters

In general, the number of accidents is expected to decrease as the number of employees increases because, generally, larger establishments have more resources that can be devoted to health and safety measures [5,9]. The proportions of office workers and female workers are expected to be negatively associated with the incidence of workplace accidents. The effect of the proportion of older workers on the number of accidents might be ambiguous. On the one hand, older workers may have fewer accidents because they are more experienced workers. On the other hand, older workers may have more accidents because they can be limited in physical strength as well as mental concentration. The proportion of foreign workers is expected to increase accidents because of their shorter tenure at the workplace.

Employees with longer weekly hours of work are more likely to be exposed to workplace danger and hazard, so that the incidence of accidents is expected to increase as the number of work-hours increases. The sales per worker is a proxy variable for the quality or the wage level of the job. If workers take dangerous jobs for high wages, we expect this variable to be positively correlated with accidents [6]. By contrast, if workers with higher incomes take safer jobs, we expect this variable to be negatively correlated with accidents [10]. Therefore, the effect of the sales per worker on accidents is an empirical matter.

Finally, as discussed in the Introduction section, there is no consensus on the impact of unions and health and safety committees on workplace accidents. A traditional belief is that unions provide information on hazards involved in jobs and protect workers who refuse to accept dangerous assignments, so that unions reduce accidents. However, unions might increase the number of reported accidents because of they have a better monitoring system and provide protection for workers who report injuries and illness [6]. Evidence of the role of health and safety committees is less

**Table 1**  
Establishment characteristics by union and health and safety committee types

	Union	Nonunion	Exclusive health and safety committee	Joint committee	No committee
Accidents rate	0.009 (0.024)	0.010 (0.035)	0.006 (0.017)	0.006 (0.011)	0.011 (0.036)
Number of workers	270.4 (1,342.6)	22.9 (40.3)	288.9 (1,196.2)	115.7 (104.1)	19.2 (21.5)
Share of office workers	0.303 (0.200)	0.319 (0.226)	0.305 (0.212)	0.303 (0.208)	0.319 (0.226)
Share of female workers	0.233 (0.234)	0.257 (0.220)	0.206 (0.205)	0.331 (0.229)	0.257 (0.221)
Share of older workers	0.070 (0.120)	0.104 (0.161)	0.046 (0.069)	0.079 (0.133)	0.106 (0.163)
Share of foreign workers	0.028 (0.070)	0.087 (0.170)	0.031 (0.058)	0.058 (0.084)	0.087 (0.172)
Sales per worker (million Korean wons)	688.5 (1,007.6)	253.4 (557.7)	631.8 (986.9)	506.2 (711.1)	249.5 (552.0)
Weekly hours, %					
Less than 40	2.73	1.35	1.77	0.08	1.39
40–50	82.65	84.48	79.14	87.23	84.60
50–60	11.50	10.91	14.75	9.50	10.79
60 and more	3.13	3.26	4.35	3.19	3.21
Number of observations	348	2,652	449	81	2,470

Accident rate is measured as the proportion of all workers who experienced injuries and illness. Values are presented as means and standard deviations are in parentheses. Weekly hours of 40–50 indicates a percentage of establishments whose average weekly hours are as many as 40 but fewer than 50. This also applies to 50–60. All values are calculated using the sample weights.

controversial. However, it seems that how a health and safety committee is formed is important in reducing workplace accidents [7].

### 3. Results

#### 3.1. Descriptive statistics

The means and standard deviations of the variables by union and health and safety committee types are presented in Table 1. First, we compared the means between unionized and nonunionized establishments. The average accident rate for the union sector was 0.009, and the corresponding rate for the nonunion sector was 0.01. Although the former was smaller than the latter, the difference was not statistically significant at the 5% level ( $p = 0.73$ ). The average number of workers for unionized establishments was, however, larger than that for nonunionized establishments, its difference being statistically significant at the 1% level ( $p < 0.001$ ). There appeared to be no clear distinction for the shares of office and female workers between union and nonunion sectors. By contrast, the shares of older and foreign workers in the unionized sector

were much lower than those in the nonunionized sector ( $p = 0.048$  and  $0.001$ , respectively). The amount of sales per worker was also much larger for the union sector than for the nonunion sector. The distribution of weekly hours for the union sector was a bit more skewed to the left than for the nonunion sector. We rejected the hypothesis that the two distributions are identical (Pearson  $\chi^2_{(3)} = 50.19, p < 0.001$ ).

Next, we examined the differences among the three types of health and safety committees. The average accident rates for establishments with an exclusive health and safety committee and those with a joint committee were almost the same (0.005). However, the accident rate of establishments without any joint committees dealing with injury and illness was much higher (0.1). The equality of the three group means was clearly rejected ( $F_{2,2997} = 6.7, p = 0.001$ ). The average number of workers for establishments with an exclusive health and safety committee was largest, followed by those with a joint committee. The shares of female, older, and foreign workers for establishments with an exclusive committee were small relative to those without the committee. The amount of sales per worker was, however, larger

**Table 2**  
Estimation results of negative binomial models

	Model 1		Model 2		Model 3	
	Coefficient (SD)	Odds ratio (SD)	Coefficient (SD)	Odds ratio (SD)	Coefficient (SD)	Odds ratio (SD)
Union	0.604 (0.036)	1.830 (0.066)	0.595 (0.036)	1.812 (0.065)	0.569 (0.036)	1.767 (0.063)
Hscommittee1	-0.134 (0.038)	0.874 (0.033)	-0.115 (0.038)	0.891 (0.033)	-0.149 (0.038)	0.862 (0.033)
Hscommittee2	-0.222 (0.063)	0.801 (0.051)	-0.122* (0.062)	0.885* (0.055)	-0.151 (0.062)	0.860 (0.054)
Ln(emp)	0.667 (0.010)	1.948 (0.020)	0.678 (0.010)	1.970 (0.021)	0.671 (0.010)	1.956 (0.020)
Office			-0.238 (0.042)	-0.238 (0.042)	-0.279 (0.042)	0.757 (0.032)
Female			-1.025 (0.041)	0.359 (0.015)	-0.977 (0.041)	0.377 (0.015)
Older			0.460 (0.054)	1.584 (0.086)	0.461 (0.054)	1.586 (0.086)
Foreign			1.229 (0.046)	3.418 (0.158)	1.159 (0.047)	3.187 (0.148)
Weekhr			–	–	0.098 (0.016)	1.103 (0.017)
Salesperwrk			–	–	0.132 (0.014)	1.000 (0.000)
Constant	-3.674 (0.031)	0.025 (0.001)	-3.575 (0.038)	0.028 (0.001)	-3.789 (0.051)	0.023 (0.001)
Alpha ( $\alpha$ )		1.990 (0.040)		1.767 (0.037)		1.746 (0.037)
Log-likelihood		-59,508.5		-58,716.9		-58,421.1
Test of alpha ( $\alpha$ ) = 0		$\bar{\chi}^2_{(01)} = 1.2 \times 10^4$ $p < 0.001$		$\bar{\chi}^2_{(01)} = 1.0 \times 10^4$ $p < 0.001$		$\bar{\chi}^2_{(01)} = 1.0 \times 10^4$ $p < 0.001$
Number of observations		3,000		3,000		2,967

Estimation is done by the maximum likelihood method using the sample weights. Likelihood ratio tests suggest that negative binomial models are better than Poisson models.

\* Not significant at the 5% level.

SD, standard deviation.

**Table 3**  
Accident rates by union and health and safety committee (%)

	No committee	Joint committee	Exclusive health and safety committee	F statistics (p)
Union	1.18	0.34	0.75	22.24 (0.00)
Nonunion	1.08	0.61	0.46	51.52 (0.00)
F statistics (p)	1.32 (0.25)	11.18 (0.00)	31.40 (0.00)	25.86 (0.00)

F statistics at the end of columns and rows are obtained by one-way analysis of variance (ANOVA). F statistics at the right corner of the table is obtained by two-way ANOVA.

for establishments with an exclusive committee than the rest. Finally, the distribution of weekly hours for establishments with an exclusive committee was quite different from that in the other two groups. The tails of the distribution were thicker for establishments with an exclusive committee. We strongly rejected the hypothesis that the two distributions are identical. (Pearson  $\chi^2_{(6)} = 117.6$ ,  $p < 0.001$ ).

### 3.2. Estimates of negative binomial regression models

The maximum likelihood estimation results for the negative binomial count data models are presented in Table 2. Model 1 includes only major variables that we are interested in, and Models 2 and 3 include additional control variables. At the bottom of Table 2, we tested whether an overdispersion of the Poisson distribution exists. In all three models, we rejected the hypothesis that  $\alpha = 0$ , indicating that the negative binomial model is better than the Poisson model.

The coefficients on union dummy are positive and statistically significant, suggesting that having unions at the establishment increases the incidence of accidents. This result is consistent with what Fenn and Ashby [5] and Donado [6] have found, and it may be so because unions tend to report accidents more. By contrast, having an exclusive health and safety committee or a joint committee significantly reduces the probability of accidents. Odds

ratios in Model 3 indicate that the accident rate for establishments having any kind of health and safety committees is 0.86 times the accident rate for establishments without such committees. It seems that a joint health and safety committee, not the union, is an effective mechanism in reducing workplace accidents.

The largest coefficient on the logarithm of employment among the three models is 0.678, and it is significantly less than 1 ( $\chi^2_{(1)} = 947.3$ ,  $p < 0.001$ ). If the coefficient on the logarithm of employment is equal to 1, then establishment size has no independent effect on the probability of accidents. Because we reject this hypothesis and the coefficient is significantly smaller than 1, establishment size is expected to reduce the probability of accidents.

Office and female workers were found to be associated with low accident rates whereas older and foreign workers were associated with high accident rates. The longer the weekly hours of work, the higher the probability of accidents. These results are consistent with our prior expectation. The coefficient on the sales per worker, a proxy for wage, is positive, indicating that high numbers of accidents are associated with high compensating wages [11].

### 3.3. Interaction effects of unions and health and safety committees

The previous section analyzed the effects of unions and health and safety committees on workplace accidents separately. In reality, the roles of unions and health and safety committees overlap—that is, some establishments have both unions and health and safety committees whereas others have either one of them or none at all. Will the unionized establishments with health and safety committees still have higher accident rates than those without health and safety committees? To answer this question, we needed to examine the interaction effects of unions and health and safety committees.

Table 3 presents accident rates for six types of establishments: (1) nonunionized establishments without any kinds of committees, (2) nonunionized establishments with a joint committee, (3) nonunionized establishments with an exclusive health and safety

**Table 4**  
Estimation results of negative binomial models with interactions between union and health and safety committees

	Model 1		Model 2		Model 3	
	Coefficient (SD)	Odds ratio (SD)	Coefficient (SD)	Odds ratio (SD)	Coefficient (SD)	Odds ratio (SD)
Union	0.568 (0.049)	1.765 (0.088)	0.653 (0.049)	1.921 (0.095)	0.615 (0.049)	1.850 (0.091)
Hscommittee1	-0.197 (0.043)	0.821 (0.035)	-0.132 (0.043)	0.876 (0.037)	-0.171 (0.043)	0.842 (0.036)
Hscommittee2	-0.090* (0.071)	0.914* (0.064)	0.049* (0.069)	1.050* (0.073)	0.013* (0.070)	1.013* (0.070)
Union × Hscommittee1	0.161 (0.073)	1.175 (0.086)	-0.026* (0.072)	0.9741* (0.070)	-0.003* (0.072)	0.997* (0.072)
Union × Hscommittee2	-0.495 (0.141)	0.610 (0.086)	-0.714 (0.138)	0.490 (0.067)	-0.669 (0.137)	0.512 (0.070)
Ln(emp)	0.669 (0.010)	1.952 (0.020)	0.680 (0.010)	1.974 (0.021)	0.673 (0.010)	1.960 (0.020)
Office			-0.233 (0.042)	0.792 (0.033)	-0.273 (0.043)	0.761 (0.032)
Female			-1.034 (0.041)	0.356 (0.015)	-0.985 (0.041)	0.374 (0.015)
Older			0.467 (0.054)	1.595 (0.087)	0.467 (0.054)	1.595 (0.087)
Foreign			1.231 (0.046)	3.425 (0.159)	1.161 (0.047)	3.194 (0.149)
Weekhr					0.098 (0.016)	1.103 (0.017)
Salesperwrk					0.130 (0.014)	1.139 (0.016)
Constant	-3.679 (0.031)	0.025 (0.001)	-3.583 (0.038)	0.028 (0.001)	-3.795 (0.051)	0.022 (0.001)
Alpha ( $\alpha$ )		1.987 (0.040)		1.763 (0.037)		1.743 (0.037)
Log-likelihood		-59,497.8		-58,703.5		-58,408.9
Likelihood ratio test of alpha ( $\alpha = 0$ )		$\bar{\chi}^2_{(01)} = 1.2 \times 10^4$ $p < 0.001$		$\bar{\chi}^2_{(01)} = 1.0 \times 10^4$ $p < 0.001$		$\bar{\chi}^2_{(01)} = 1.0 \times 10^4$ $p < 0.001$
Number of observations		3,000		3,000		2,967

Estimation is done by the maximum likelihood method using the sample weights. Likelihood ratio tests suggest that negative binomial models are better than Poisson models. The base category is establishments without unions and health and safety committees.

\* Not significant at the 5% level.

SD, standard deviation.

committee, (4) unionized establishments without any kinds of committees, (5) unionized establishments with a joint committee, and (6) unionized establishments with an exclusive health and safety committee.

It is interesting to see from Table 3 that the effects of unions on accident rates depended on whether a health and safety committee existed at the workplace. This finding is consistent with the observation made by Markey and Patmore [12] that the effectiveness of health and safety committees depended on a complementarity of variables such as unions. The accident rate was lowest when there was a union and a joint committee dealing with health and safety issues, whereas the accident rate was highest when there was a union but no committees at all. Therefore, the effect of unions on workplace accidents seemed to depend on whether there was a joint (health and safety) committee at the establishment.

Table 4 presents the estimation results from the negative binomial count data models, which now include interaction terms between union and health and safety committee dummies. As before, the coefficients on the union dummy are all positive and statistically significant at the 5% level. The coefficients on an exclusive health and safety committee (*Hscommittee1* dummy) are negative and statistically significant at the 5% level, whereas the coefficients on a joint committee (*Hscommittee2* dummy) are not significantly significant at the 5% level in all three models.

The interactions between the union dummy and the exclusive health and safety committee dummy ( $union \times Hscommittee1$ ) are not significantly significant at the 5% level in Models 2 and 3, which implies that there is no additional effect of the exclusive health and safety committee in reducing accidents when establishments are unionized. However, the interactions between the union dummy and the joint committee dummy ( $union \times Hscommittee2$ ) are all negative and notably significant at the 5% level, which implies that the joint committee can further reduce accidents when establishments are unionized.

In sum, the estimates on union, health and safety committees, and interaction dummies indicate that in unionized establishments, joint committees can effectively reduce workplace accidents, whereas in nonunionized establishments exclusive health and safety committees can work better in reducing accidents. The effects of office, female, older, and foreign workers on workplace accidents were not qualitatively different from those presented in Table 2. Also, the weekly hours of work and the sales per worker were positively associated with a higher incidence of accidents as before.

#### 4. Discussion

Despite its rapid economic growth, Republic of Korea is still suffering from a high level of industrial accidents. In fact, industrial accidents are one of the major problems that need to be solved. In this study, we explored the roles of unions and health and safety committees in reducing the incidence of accidents. The results obtained here are both encouraging and discouraging. It is encouraging because health and safety committees, whether exclusive or not, were found to reduce the incidence of accidents. By contrast, it is discouraging because unionized establishments have higher incidence of accidents than nonunionized establishments. This result, however, is consistent with what Fenn and Ashby [5] and Donado [6] have found.

Donado [6] suggested several reasons why unionized establishments have higher accident rates. First, unions may actually

reduce accidents, but report more accidents (*reporting bias*). Second, more dangerous establishments are unionized (*selection bias*). Third, unions may prefer higher wages over safer workplaces (*compensating bias*). In our regression model, we controlled for sales per worker, which is a proxy for wages. Therefore, we are free from compensating bias. We run additional regressions, which include three-digit industry dummies and still found that the coefficient on our union dummy was positive and statistically significant. Therefore, we conclude that selection bias did not cause any major problems. For now, we suspect that unionized establishments have higher accident rates because they tend to report more accidents.

Finally, we found that the effects of unions and health and safety committees on accidents depend on their interactions. Health and safety committees can more effectively reduce accidents in nonunionized establishments. This may be so because health and safety committees are probably a reliable mechanism to reduce accidents when workers are not protected by unions. By contrast, nonexclusive joint committees can more effectively reduce accidents in unionized establishments. This indicates that unions and health and safety committees can be complementary in a specific way. At this point, it is difficult to know why a particular combination of unions and health and safety committees is more effective than others. Further research is necessary to fully understand the nature of complementarity between unions and health and safety committees in reducing workplace accidents.

#### Conflicts of interest

All authors have no conflicts of interest to declare.

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#### References

- [1] Korean Statistical Information Service. Industrial fatality rates of countries [Internet]. [Cited 2015 Oct]. Available from: [http://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT\\_2KAA308\\_OECD](http://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_2KAA308_OECD).
- [2] Boal WM. The effect of unionism on accidents in US coal mining, 1897–1929. *Ind Relat J* 2009;48:97–120.
- [3] Garen J. Compensating wage differentials and the endogeneity of job riskiness. *Rev Econ Stat* 1998;70:9–16.
- [4] Wallace M. Dying for coal: the struggle for health and safety conditions in American coal mining, 1930–83. *Soc Forces* 1987;66:335–64.
- [5] Fenn P, Ashby S. Workplace risk, establishment size and union density. *Br J Ind Relat* 2004;42:461–80.
- [6] Donado A. Why do unionized workers have more nonfatal occupational injuries? *ILR Rev* 2015;68:153–83.
- [7] Reilly B, Paci P, Holl P. Unions, safety committees and workplace injuries. *Br J Ind Relat* 1995;33:275–88.
- [8] Long JS, Freese J. Regression models for categorical dependent variables using Stata. 3rd ed. Texas (US): STATA Press; 2014. p. 507–16.
- [9] Frick K, Walters DR. Workers representation on health and safety in small enterprises: lessons from a Swedish approach. *Int Labour Rev* 1998;137:367–89.
- [10] Viscusi W. Worker's compensation: wage effects, benefit inadequacies and the value of health losses. *Rev Econ Stat* 1978;69:249–61.
- [11] Rosen S. The theory of equalizing differences. In: Ashenfelter O, Layard R, editors. *Handbook of labor economics* Vol. 1. New York (NY): North-Holland; 1986. p. 641–92.
- [12] Markey R, Patmore G. Employee participation in health and safety in the Australian steel industry, 1935–2006. *Br J Ind Relat* 2011;49:144–67.