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Company-level determinants of disability retirement: a multilevel study of Finnish private sector workplaces

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Abstract

Background: We examined whether the risk for disability retirement varies between companies over and above the individual-level characteristics of their employees and which company-level characteristics are associated with the risk for any, full or partial disability retirement.

Methods: A 30 percent random sample of Finnish private sector companies with at least 10 employees was used (5.567 companies, 301.313 employees). The risk for disability retirement over 6 years was analysed using multilevel logistic regression. Company size and industry, as well as gender, age, education and social class measured both at the individual- and the company-level were used as explanatory variables.

Results: 3.8 percent of the variance in the risk for disability retirement was attributed to the company level after controlling for individual-level characteristics of the employees. Company-level variance was much larger in partial (11.7 percent) than in full (4.2 percent) disability retirement. After controlling for all individual- and company-level characteristics, those working in health and social work activities had increased risk for both full and partial disability retirement. The risk for full disability retirement increased by decreasing educational level of the company. The risk for partial disability retirement increased by increasing company size and was elevated in companies with the highest proportion of women.

Conclusions: After controlling for the individual-level characteristics, variation in the risk for disability retirement between companies was modest. The more substantial variation in partial disability pension suggests that companies have a marked role in advancing working with partial disabilities.

Keywords: Disability retirement; company; workplace; partial work ability; multilevel study

Introduction

In the OECD countries, six percent of working-age population has left the labour market due to disability [1]. Early exit from working life incurs large costs for societies and poses challenges to the well-being of the early retirees. Due to the pressures caused by population aging on the social security systems, prevention of work disability is becoming increasingly important.

More evidence is therefore needed on factors predicting exit from working life due to disability retirement. However, earlier research has mostly concentrated on individual-level risk factors. Demographic characteristics of the employees, such as high age and low socioeconomic position, are strongly associated with the risk for disability retirement [2-4]. Also poor working conditions, including high physical workload and exposure to psychosocial risk factors, have been associated with disability retirement in several studies [5-9]. However, some studies have also reported that working conditions measured at the work-unit level [10-12] and other organizational characteristics [13, 14] may increase the risk for disability retirement. Such findings suggest that not only the individual-level risk factors but also company-level characteristics may contribute to exit from the labor market through disability retirement.

Compared to risk factors measured at the individual level, little is known how company-level characteristics, such as company size or the proportion of employees doing manual work, affect disability retirement. However, there are good reasons to expect that also company-level characteristics may influence the risk for disability retirement among their employees. Companies in different industries or with different socioeconomic structure

have dissimilar physical and psychosocial hazards. High risk for disability retirement has been observed in the male-dominated construction industry [15-17] as well as female-dominated industries of child-care and cleaning [18, 19]. In addition to such structural differences, employer policies and practices concerning prevention and management of disability at the workplace may differ. Companies may have differences in supporting work ability among their employees and in the actions they direct to workers with disabilities and those with signs of becoming disabled in the future [20].

In the present study, we examined whether companies differ in their risk for disability retirement over and above the individual-level characteristics of their employees using multilevel modelling with register-based data on Finnish private sector companies. Furthermore, we examined which characteristics of the companies are associated with the risk for disability retirement.

Methods

A 30% random sample of all private sector companies with at least 10 employees in Finland at the end of 2010 was drawn from the database of companies' earnings-related pension contributions [21]. Persons aged 25–62 years working in these companies were then tracked down using insurance numbers. The dataset included 301.313 employees in 5.567 companies.

The combined company-employee dataset was linked with information on the incidence of disability retirement at the individual level until the end of 2016. During the six-year follow-up, 9.255 employees retired due to disability.

In Finland, a disability pension can be granted as full if the applicant's work disability is reduced for at least 60 percent. If one's work ability is reduced for 40 percent a partial disability pension can be granted. It could be assumed that company-level variation is larger for partial disability retirement as less restrictive illnesses may allow better possibilities for job modification and other workplace interventions. Therefore, the risk for full and partial disability retirement was examined also separately. The number of full disability retirees was 6.791 and that of partial disability retirees 2.464.

Individual- and company-level characteristics used in the study are shown in Table 1. The individual-level characteristics depict the employees' own attributes whereas the company-level characteristics are the same for all employees in a particular company. The individual-level characteristics were gender, age, educational level and occupational class. Age was categorized as 25–34, 35–44, 45–54 and 55–62 years. Educational level was classified into primary education or no qualifications, secondary, lower tertiary and

higher tertiary education. Social class was classified into manual workers, lower non-manual employees, and upper non-manual employees, and others/unknown.

Company-level characteristics were company size and industry. Company size was classified into quintiles according to the number of employees at the company. Industry was classified into 11 groups by combining closely related industries of the Standard Industrial Classification of Statistics Finland. In addition, four aggregated company-level characteristics were created from the individual-level characteristics. These variables depict gender structure (proportion of women), age structure (proportion of >50 year old employees), educational structure (proportion of employees with tertiary education) and socioeconomic structure (proportion of manual workers) of the companies. All these aggregated company-level variables were divided into quintiles consisting of about 60.000 employees each.

Statistical methods

The data was analysed using two-level logistic regression models with employees nested in companies. We started with the empty model including only a random group indicator for the company to quantify the unadjusted company-level variance in the risk for disability retirement [22]. Next, individual-level characteristics were included to present the company-level variance when differences between the employees had been controlled for. Then, company-level characteristics were included to see whether they had additional effect even after the individual-level characteristics had already been controlled for. The effect of each of the company-level characteristics was first tested one by one and finally all of them were added simultaneously. Variance components (random effects) for the models are expressed as the

percentage of company-level variance of the total variance in the disability retirement risk. To facilitate comparison of the successive models, we also calculated the percentage change in the company-level variance compared with the empty model. Fixed effects of the company-level characteristics are presented as odds ratios (OR) with 95% confidence intervals (CI). The analyses were conducted with the xtlogit command in Stata 14.

Results

In total, 3.1 percent of the employees retired due to disability over the six-year follow-up. In 20 percent of the companies no one retired during the follow-up, while in the highest decile the proportion of disability retirees was 9.5 percent.

Table 1 gives descriptive data of the proportion of disability retirees by the four individual-level characteristics and the six company-level characteristics over the follow-up. Apart from gender, all individual-level characteristics were strongly associated with disability retirement. The proportion of disability retirees was highest in the largest companies. The proportion of disability retirees among those employed in construction was more than threefold compared to information and communication industry or professional, scientific and technical activities. The proportion of women in the company showed curvilinear association with the disability retirement. The high proportion of older employees and manual workers and the low proportion of highly educated employees were each strongly associated with disability retirement.

Of those who retired during the follow-up, nearly three out of four were granted a full disability pension (Table 1). Inter-correlations of the individual- and company-level characteristics are presented in the online supplementary table.

Table 2 shows how much of the variance in the risk for disability retirement could be attributed to the company level and how much controlling for the individual- and the company-level characteristics explained of this company-level variance. Considering the risk

for any disability retirement, 9.8 percent of the variance could be attributed to the company level. Controlling for the individual-level characteristics of the employees reduced this figure by 61 percent, after which 3.8 percent of the variance was at the company level. Controlling for the company-level characteristics further explained a part of the company-level variance, with industry and the proportion of women having the largest effects. When all individual- and company-level characteristics had been controlled for, 2.5 percent of the variance remained at the company level.

Results for full disability retirement were broadly similar than for any disability retirement (Table 2). Initially, 10.7 percent of the variance in the risk for full disability retirement could be attributed to the company level, and 61 percent of this variance was explained by the individual-level characteristics, after which 4.2 percent of the variance remained at the company level. Further controlling for the company-level characteristics reduced the proportion of company-level variance to 2.0 percent. Industry, the proportion of highly educated employees and the proportion of female employees had most effect. In contrast, in partial disability retirement, company-level variance was clearly larger than in full disability retirement, and less of this variance was explained by the individual-level characteristics: initially, 17.1 percent of the variance was attributed to the company level, and only a third of this variance was explained by the individual-level characteristics. After that 11.7 percent of the variance was at the company level. The additional effect of the company-level characteristics was also smaller than in full disability retirement.

Table 3 shows how the company-level characteristics were associated with the risk for any, full or partial disability retirement after controlling for all individual- and company-level covariates. The largest companies showed slightly increased risk for any disability

retirement. However, no association of company size was found with full disability retirement while the risk for partial disability retirement gradually increased with increasing company size. The risk for any, full and partial disability retirement was clearly increased in health and social work compared to all industries on average. Furthermore, the risk for full disability retirement was lower than average in manufacturing and trade, whereas the risk for partial disability retirement was lower than average in construction. The risk for full disability retirement was lowest in companies with intermediate proportion of women. Instead, the risk for partial disability retirement was clearly elevated in companies with the highest proportion of women. Age structure of the company was not associated with the risk for disability retirement. However, the risk for any and full disability retirement gradually increased with decreasing proportion of highly educated employees and was slightly lower in companies with higher proportion of manual workers.

Discussion

In this multilevel study of 301.313 employees in 5.567 Finnish private sector companies, we examined whether companies differ in their risk for disability retirement and whether this variation can be explained by individual- and company-level characteristics. Company-level variation in the risk for disability retirement was moderate and a major part of this variation could be explained by individual-level characteristics of the employees. After controlling for the individual-level characteristics, 3.8 percent of the variance in the risk for disability retirement was attributed to the company level. Company-level characteristics further explained some of the remaining variance in the disability retirement risk.

Company-level variation was clearly larger in partial than in full disability retirement. This is plausible, as better remaining work ability allows better possibilities for job redesign and other workplace activities. Furthermore, partial disability pensions are often granted due to musculoskeletal problems, and it may be easier to implement work accommodations in cases of musculoskeletal disorders than for example mental disorders. In Finland, the share of partial disability pensions of all disability pensions has doubled over the past decade [23]. Typically, partial disability pensioners continue working alongside their pension and companies have a marked role in making the necessary arrangements.

In addition, we examined which company-level characteristics were associated with the risk for disability retirement. In general, the associations were rather weak and differed for full and partial disability retirement.

While company size was only weakly associated with the risk for full disability retirement, it had a strong gradual association with increasing risk for partial disability retirement. The lack of an association of company size and full disability retirement is somewhat unexpected, as in Finland large companies are partly responsible for the disability pension costs of their employees, and the liability becomes gradually higher with increasing company size. Larger companies thus have a financial incentive in trying to avoid disability retirement [24]. Nevertheless, econometric studies have not found a marked effect in disability pension inflows due to this incentive [25, 26]. A possible explanation for increasing partial disability retirement with increasing company size is that larger companies have better possibilities in modifying work tasks and organizing part time work than smaller companies. Furthermore, larger companies may have better knowledge of partial disability pension and its economic aspects and larger resources to conduct disability prevention programs in general. Even though company size was strongly associated with partial disability retirement it did not contribute to the explanation of the company-level variation. The explanation for this curious finding may relate to the fact that because company size was categorized by the number of employees there are quite a few companies in the highest quintiles. Furthermore, within the largest companies company-level variation in partial disability retirement was small.

Industry was the most important company-level characteristic in explaining between-company variation in disability retirement. However, after controlling for the other individual- and company-level characteristics, particularly those measuring social class and education, only few industries differed from the average risk for disability retirement (see the supplementary table for intercorrelations). Most notably, employees working in health

and social work activities had clearly increased risk for both full and partial disability retirement. A previous Finnish study has shown increased risk for disability retirement due to depression among social workers and in various nursing occupations [27]. These occupations require social skills and emotional interaction that may be mentally demanding and stressful. Also a Swedish study showed high disability retirement risk due to mental disorders in healthcare and social work occupations [19]. Our results also agree with a previous study showing that health care occupations have the highest risk for partial disability retirement [27].

The proportion of women in the company explained some of the variation in full and partial disability retirement. After controlling for the individual- and company level characteristics, the risk for partial disability retirement was clearly increased in the companies with the highest proportion of women (73% or more). From previous research it is known that partial disability retirement is more common among women and in the female-dominated public sector [23] which was not included in the present study. Finland is a country with a strong gender segregation of occupations [28]. Typical work tasks and working conditions in female-dominated companies differ from companies with higher proportion of men. The supplementary table shows that a high proportion of women in the company is negatively correlated with the proportion of manual workers and the proportion of high income employees, giving some indication of the nature of such companies. Partial disability retirement requires smaller deterioration of work ability than full disability retirement but the clustering of partial disability retirement into the most female-dominated companies suggests that the high use of partial disability pension is also likely to reflect differences in practices, customs and familiarity of this pension form.

The proportion of highly educated explained more of the company-level variation than the proportion of manual workers, in particular concerning full disability retirement. Decreasing proportion of highly educated employees was strongly associated with increasing risk for any or full disability retirement. This is likely to relate to differences in working conditions and the type of work done in companies characterized by different educational structures. We are not aware of previous studies that would have examined whether socioeconomic characteristics of companies are associated with the risk for disability retirement. However, previous studies have shown that low job control and high job demands measured at the work unit or occupational level are associated with higher risk for disability retirement [10, 12]. While these organization-level measures may reflect shared experiences within work units or occupational groups, they may also reflect structural differences between the work units.

Methodological considerations

This study was based on unique register-based data where private sector companies and employees were linked together using insurance numbers. While the linkage was comprehensive, there may nevertheless be some heterogeneity in how the insurance numbers are assigned to the companies. While a vast majority of companies have only one insurance number, especially large companies may sometimes have several insurance numbers. However, the proportion of such companies is so small that this is unlikely to distort the findings.

In order to reliably calculate aggregated company-level characteristics, companies with less than 10 employees were omitted. Data on public sector was not available. The incidence of disability retirement in these data was 0.54 per 100 person years of follow-up, while for the full population, including also employees in companies of less than 10 employees, public sector employees, and those not employed, the corresponding incidence is 0.80. Thus, while the data is representative of the target population, it should nevertheless be remembered that a relatively healthy population was studied. Furthermore, as public sector was not included in the study, a larger proportion of women than men were excluded [29].

We measured four individual-level characteristics and six company-level characteristics. It can be argued that together these characteristics rather well depict differences between companies. Nevertheless, additional measurements of for example working conditions could have been useful in further explaining the variation between companies.

Conclusions

Variation in the disability retirement risk between companies was moderate and major part of this variation could be explained by the individual-level characteristics of the employees. However, it can be argued that approximately four percent of the variation that remained at the company level after controlling for the individual-level characteristics warrants work disability prevention efforts also at the company level. The employee's work ability is determined by the interplay between health and working conditions and companies play an important role in accommodating work tasks with one's current work

ability. It is plausible that part of the remaining company-level variation may relate to factors that can be affected at the workplace.

In partial disability retirement company-level variance was larger than in full disability retirement and could to a lesser extent be explained by the individual- and company-level characteristics. The large variation between companies suggests that companies have a marked role in further advancing the use of partial disability pension.

Health and social work industry showed high risk for both full and partial disability retirement. Special efforts are needed to reduce the risk for disability retirement in that industry. The risk of full disability retirement was also elevated in companies with a small proportion on highly educated employees. More evidence is needed on characteristics and working conditions in such companies.

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Conflicts of interest

None declared

Key points

- Modest company-level variation remained in the risk for disability retirement after the individual-level characteristics of the employees had been controlled for.

- In addition to general work ability programs, company-level interventions aiming to reduce disability retirement should focus on high risk individuals.

- The more substantial company-level variation in partial than in full disability retirement suggests that companies have a marked role in advancing working with partial disabilities.

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Table 1. Distributions of the individual- and the company-level characteristics and the proportion (%) of all disability retirees, full disability retirees and partial disability retirees by these characteristics over the six-year follow-up

		% disability retirees over the follow-up 2011-2016		
	Mean (range) / Percent[a]	All	Full	Partial
Individual-level characteristics				
Gender				
Men	60	3.0	2.4	0.7
Women	40	3.1	2.1	1.0
Age				
25-34	32	0.8	0.7	0.1
35-44	28	1.5	1.3	0.3
45-54	27	4.6	3.2	1.4
55-62	14	8.4	5.9	2.5
Level of education				
Higher tertiary	11	0.9	0.6	0.3
Lower tertiary	28	1.7	1.2	0.6
Secondary	47	3.6	2.6	0.9
Primary	14	5.7	4.4	1.4
Social class				
Higher non-manual	21	1.3	0.9	0.4
Lower non-manual	38	2.5	1.7	0.8
Manual	38	4.5	3.4	1.1
Other/unknown	4	3.9	3.2	0.7
Company-level characteristics				
Number of employees (quintiles)				
Lowest	18 (10–29)	3.2	2.6	0.6
2nd	55 (30–95)	2.9	2.2	0.7
3rd	188 (96–313)	2.9	2.1	0.8
4th	676 (315–1.232)	2.8	1.9	0.9
Highest	2.850 (1.341–5.799)	3.6	2.5	1.1
Industry				
Manufacturing	31	3.4	2.4	1.0
Construction	7	4.6	4.0	0.6
Trade	17	2.9	2.0	0.9
Transportation and storage	7	3.6	3.0	0.7
Accommodation and food services	2	2.7	1.9	0.8
Information and communication	6	1.4	1.0	0.4
Financial and insurance activities	3	2.1	1.4	0.8
Professional, scientific and technical activities	6	1.4	1.0	0.4
Education	2	2.0	1.2	0.7
Health and social work	7	4.0	2.6	1.4
Other services	12	2.9	2.3	0.6
Proportion of women (quintiles)				
Smallest	7 (0–12)	4.2	3.4	0.8
2nd	17 (12–24)	2.6	2.0	0.7
3rd	34 (24–47)	2.4	1.7	0.7
4th	60 (47–72)	2.7	2.0	0.7
Largest	85 (73–100)	3.5	2.2	1.2
Proportion of>50 old employees (quintiles)				
Smallest	8 (0–15)	1.7	1.3	0.4
2nd	19 (15–24)	2.7	1.9	0.7
3rd	27 (24–29)	3.1	2.2	0.9
4th	32 (29–36)	3.4	2.4	0.9
Largest	45 (36–91)	4.6	3.4	1.1
Proportion of highly educated (quintiles)				
Largest	77 (63–100)	1.6	1.0	0.6
4th	52 (40–63)	2.2	1.6	0.7
3rd	33 (27–40)	3.1	2.2	0.9
2nd	22 (17–27)	4.0	3.0	1.0
Smallest	12 (0–17)	4.3	3.5	0.9
Proportion of manual workers (quintiles)				
Smallest	1 (0–2)	2.1	1.4	0.7
2nd	10 (2–20)	2.6	1.8	0.8
3rd	36 (20–50)	2.6	1.9	0.7
4th	61 (50–70)	3.6	2.6	1.0
Largest	81 (70–100)	4.5	3.6	0.9
All	301.313	3.1	2.3	0.8

[a] Mean and range is presented for the variables divided in quintiles, column percent for the other variables

Table 2. Company-level variation in the risk of disability retirement and the effect of controlling for individual- and company-level characteristics to this variation. Intraclass correlation coefficient (ICC) and standard error (s.e.) and the percentual reduction of the company-level variation after controlling for the company-level characteristics, compared to the empty model with no covariates

	Any disability pension		Full disability pension		Partial disability pension	
	ICC (s.e.)	% reduction	ICC (s.e.)	% reduction	ICC (s.e.)	% reduction
0: Empty model	0.098 (0.006)		0.107 (0.007)		0.171 (0.014)	
1: All individual-level characteristics	0.038 (0.004)	-61	0.042 (0.005)	-61	0.117 (0.013)	-32
2: 1+ Number of employees	0.038 (0.004)	-61	0.037 (0.005)	-65	0.115 (0.013)	-32
3: 1+ Industry	0.032 (0.004)	-67	0.032 (0.005)	-70	0.107 (0.012)	-37
4: 1+ Proportion of women	0.033 (0.004)	-66	0.035 (0.005)	-67	0.110 (0.012)	-36
5: 1+ Proportion of>50 old employees	0.038 (0.004)	-61	0.041 (0.005)	-61	0.117 (0.013)	-31
6: 1+ Proportion of highly educated	0.035 (0.004)	-64	0.033 (0.005)	-69	0.116 (0.013)	-32
7: 1+ Proportion of manual workers	0.036 (0.004)	-63	0.038 (0.005)	-64	0.115 (0.012)	-33
8: 1+ All company-level covariates	0.025 (0.004)	-75	0.020 (0.004)	-81	0.096 (0.013)	-44

Table 3. Associations of the company-level characteristics with the risk of any, full and partial disability retirement. Fixed effects presented as odds ratios (OR) and 95% confidence intervals (95% CI) after controlling for all individual- and company-level variables simultaneously

	Any disability pension OR (95% CI)	Full disability pension OR (95% CI)	Partial disability pension OR (95% CI)
Number of employees (quintiles)			
Lowest	1.00	1.00	1.00
2nd	0.96 (0.89-1.03)	0.92 (0.85-1.00)	1.12 (0.96-1.31)
3rd	0.97 (0.90-1.06)	0.90 (0.83-0.99)	1.28 (1.08-1.51)
4th	1.03 (0.94-1.14)	0.89 (0.80-0.99)	1.60 (1.31-1.95)
Highest	1.19 (1.04-1.37)	1.03 (0.90-1.18)	1.94 (1.46-2.57)
Industry			
Manufacturing	0.95 (0.88-1.02)	0.90 (0.83-0.98)	1.13 (0.97-1.33)
Construction	1.02 (0.91-1.13)	1.10 (0.98-1.24)	0.69 (0.52-0.91)
Trade	0.91 (0.84-0.99)	0.91 (0.82-0.99)	0.98 (0.83-1.17)
Transportation and storage	1.04 (0.93-1.16)	1.06 (0.95-1.19)	1.00 (0.78-1.27)
Accommodation and food services	0.93 (0.78-1.11)	0.91 (0.74-1.10)	1.08 (0.76-1.53)
Information and communication	0.92 (0.80-1.07)	0.92 (0.78-1.09)	0.94 (0.70-1.25)
Financial and insurance activities	0.89 (0.75-1.07)	0.88 (0.72-1.08)	0.95 (0.69-1.29)
Professional, scientific and technical activities	0.90 (0.79-1.03)	0.93 (0.79-1.09)	0.88 (0.67-1.14)
Education	1.00 (0.82-1.21)	0.93 (0.74-1.17)	1.18 (0.84-1.66)
Health and social work	1.47 (1.32-1.63)	1.43 (1.28-1.61)	1.48 (1.21-1.81)
Other services	1.08 (0.99-1.17)	1.14 (1.04-1.25)	0.90 (0.74-1.08)
Proportion of women (quintiles)			
Smallest	1.00	1.00	1.00
2nd	0.94 (0.86-1.03)	0.94 (0.85-1.03)	0.97 (0.79-1.18)
3rd	0.87 (0.79-0.96)	0.85 (0.77-0.95)	0.97 (0.78-1.19)
4th	0.98 (0.88-1.09)	0.95 (0.84-1.06)	1.19 (0.95-1.48)
Largest	1.01 (0.89-1.13)	0.88 (0.77-1.01)	1.52 (1.19-1.94)
Proportion of>50 old employees (quintiles)			
Smallest	1.00	1.00	1.00
2nd	1.06 (0.96-1.18)	1.06 (0.95-1.18)	1.08 (0.87-1.33)
3rd	0.99 (0.89-1.10)	1.00 (0.89-1.12)	0.98 (0.78-1.22)
4th	1.04 (0.94-1.14)	1.07 (0.96-1.19)	0.94 (0.76-1.16)
Largest	1.05 (0.95-1.15)	1.06 (0.96-1.18)	1.05 (0.85-1.28)
Proportion of highly educated (quintiles)			
Largest	1.00	1.00	1.00
2nd	1.09 (0.96-1.23)	1.24 (1.08-1.42)	0.83 (0.67-1.05)
3rd	1.29 (1.13-1.47)	1.47 (1.27-1.70)	0.97 (0.76-1.24)
4th	1.42 (1.24-1.62)	1.67 (1.44-1.94)	1.00 (0.78-1.29)
Smallest	1.44 (1.25-1.66)	1.78 (1.52-2.09)	0.83 (0.63-1.10)
Proportion of manual workers (quintiles)			
Smallest	1.00	1.00	1.00
2nd	0.91 (0.82-1.01)	0.94 (0.83-1.06)	0.83 (0.67-1.02)
3rd	0.75 (0.66-0.85)	0.76 (0.65-0.87)	0.70 (0.54-0.91)
4th	0.81 (0.69-0.94)	0.76 (0.64-0.90)	0.94 (0.70-1.28)
Largest	0.83 (0.71-0.98)	0.82 (0.68-0.97)	0.79 (0.57-1.10)

*Reference category marked with 1.00, industries compared with to the average of all industries.