UNIVERSITÀ DEGLI STUDI DI SIENA

QUADERNI DEL DIPARTIMENTO
DI ECONOMIA POLITICA

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Accidents and illnesses at the workplace
Evidence from Italy

n. 608 – Febbraio 2011

Abstract - The 2007 Italian Labour Force Survey contains employee-level data that allow us to analyse the determinants of work safety. Among the most significant determinants of accidents and illnesses occurring at work we find bad working conditions, not being in the first job, dissatisfaction with the current job, gender, and a latent proneness observed with occurrence of accident on the way to work. In line with the majority of economic literature, we do not find having a fixed-term contract significant. Other important findings point out that work accidents and work illnesses are two deeply correlated phenomena, and that there is a structural break after three years of tenure to be taken into account.

Keywords: Work safety, Work accidents, Work illnesses, Fixed-term contracts, Working Conditions.
JEL classification: J24, J28, J41

Acknowledgements: We are grateful to Alberto Baccini, Lucio Barabesi, Massimiliano Castellani, Pierpaolo Pattitoni, Laura Vici, and Lorenzo Zirulia for their useful comments. The usual disclaimers apply.

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1. Introduction

In the last few years interest in work safety has been rising around the world. According to new estimates by the International Labour Organization, every year, across the globe, there are 2.3 million deaths for occupational accidents and work related illnesses, in addition to 337 million nonfatal serious accidents (ILO 2010). In 2002 and then in 2007 the European Union defined a new strategy (European Commission 2002; 2007) for the following years to bring about an ongoing reduction in work accidents and illnesses. In spite of the progress achieved and the decrease in the number of both serious accidents/illnesses and deaths at the workplace in European countries in latest years, work related risks have not been reduced in a uniform way and some categories of workers, companies and sectors are still overexposed (Venema et al. 2009). Furthermore, the nature of work risks is changing due, on the one hand, to technological innovation and to changes in production organization, etc., and on the other hand, to the important transformation that the European labour market has been facing (e.g. new type of contracts, the rising number of women that work, new and large waves of migrants, etc.). For all these reasons, the topic of work safety is a very relevant problem for policy makers and it needs to be studied in depth.

In literature, the problem of work accidents and illnesses has been analysed from different points of view. Some studies explore the relationship between wage and workplace risk, considering a job as a good characterized by amenities and disamenities (salary, time of work, safety, etc.). For instance, Hamermesh (1999) demonstrates that increasing wage inequality is accompanied by increasing work disamenities, among them also the risk of accident. Viscusi's model (1978) shows that wages paid to workers are the result not only of their characteristics but also of a perceived occupational risk by workers. In addition to wage many other variables are investigated. Thomason and Pozzebon (2002) analyze health and safety practices at the workplace and workers' compensation claim management in a group of firms in Canada in 1995. They find that experience-rating of workers' compensation insurance has a direct impact on firms' health and safety efforts. Moreover, they highlight a systematic relationship between wages and compensation cost reduction strategy, with high-wage firms more likely than low-wage firms to emphasize improvement of health and safety over claims management. Worral and Butler (1983) focus their analysis on the difference in the work accident risk between blue-collar union workers and blue-collar nonunion workers. Another paper (Fabiano et al. 2004), about the relationship between work accident frequency and firm size and type, finds an inverse correlation between a frequency index referred to all injuries and firm size. Moreover, a study on the Italian case (Leombruni et al. 2010) that investigates the causal effect of displacement on job-related injury rate, finds that re-employed displaced workers have more probability of being injured in the post-displacement period than non-displaced workers. Other analyses, addressing the problem

of racial inequality on the workplace, find that black workers face a higher rate of work death than white workers (Leigh 1983; Stout et al. 1996). Another study (Oh, Hang Shin 2003) highlights no association between race and non-fatal work accidents; it finds that the crucial determinants of work accidents are human capital (both education and work experience) and occupational conditions (occupational position and work activity). Zimmermann et al. (1999) analyse the interdependence between native and foreign workers, finding no significant differences between the two groups of workers, even if the employment of foreign workers seems to have a strong positive effect on the job safety of natives. Lastly, Marvasti (2010) studies the link between the language proficiency or cultural differences of foreign-born workers in the United State with American workers and the prevalence of work injuries among them, finding some support for the adverse effect of inadequate English language proficiency on foreign-born and robust results for a cultural gap hypothesis.

In the latest years a part of economic literature has focused on the relationship between nonfatal accidents at work and types of contracts. It is worth noticing that between 1999 and 2007 the percentage of employees with a contract of limited duration has risen from 11.8% to 14.5% in the European Union (considering 27 Member States) (European Union 2010). This point is very relevant in the analysis of work safety because, as shown in a recent study on working conditions in 31 European countries (Parent-Thirion et al. 2007), temporary workers have fewer opportunities to receive training at the workplace. Furthermore, limited experience might also lead the worker to underestimate the risk associated with a particular work situation (Quinlan 1999). Therefore, the kind of contract and the amount of work experience might influence the likelihood of injury. In addition, working conditions might be worse for those workers hired with temporary contracts due to their low bargaining power. At the same time, it may happen that employers tend to invest less in health and safety for fixed-term contract workers than for permanent workers, and tend not to involve temporary workers in safety protection plans (Hebdon, Stern 1998, Amuedo-Dorantes 2002). Several empirical analyses based on microdata, however, find different or even contradictory results about work accidents and fixed-term contracts.

Reviewing this empirical literature, first of all there are studies that concentrate on particular sectors. For instance, Blank et al. (1995) find that in the Swedish mining sector accidents occurring to temporary workers (contractor workers) are more frequent and more severe than those occurring to full-time workers. Duprè (2001), on the basis of 1999 data regarding the European countries, discovers that the risk of accidents for temporary workers who had been employed for less than two years, is particularly high in the construction, health, and social sectors. The paper by Guadalupe (2003), using data referring to the period 1989-1998 for Spain, is the most relevant case in favour of a strong positive effect of fixed-term contract on work accidents. Medical studies also deal with the issue of work safety and temporary contracts. For example, a survey (Virtanen et al. 2005) on reports

about temporary contracts and health shows that temporary workers may have a higher risk of psychological morbidity and work injuries in comparison to permanent workers. However, Benavides et al. (2006) find that even though temporary workers seem to have a higher risk in experiencing work injuries than permanent workers, the probability of accidents among the formers approximates that of the latters after controlling for the length of employment of each.. Many other papers confirm that fixed-term and open-ended contracts lead to a similar probability of suffering a work accidents if all the relevant variables are taken into account. For instance, Amuedo-Dorantes (2002), using data referred to 1997 for Spain, finds that the higher rates of accidents/illnesses for temporary workers are due to their worse working conditions. Also the results of the study of Hernanz and Toharia (2006), based on 1999 Spanish and Italian data, show that the differential of accident rates between temporary and open-ended workers vanishes once personal and job characteristics are controlled for. As reported, there are many empirical analyses that focus on particular aspects of nonfatal accidents and illnesses. The main objective of this study, on the contrary, is to enrich the comprehension of work safety as a whole by offering a broad view of the phenomenon. In particular, our work attempts to study the key determinants of work safety by looking at, for both accidents and illnesses, types of contract and then at personal, firm, and job characteristics, among which working conditions. Indeed, we want to test if temporary and permanent workers are subject to different types of workplace safety. The only work of this kind among those cited refers to 1997 data for Spain (Amuedo-Dorantes 2002). Our analysis uses data collected ten years later, when the labour market had changed, and focuses on Italy.[1] Moreover, we make use of a wider array of econometric tools in order to control for the robustness of the results. Firstly, our empirical investigation analyses separately if there is a relationship between the likelihood of suffering work accidents and work illnesses and types of contracts, by controlling for job, firm, and personal characteristics, through a probit regression. Secondly, we present a joint analysis of the probability of accident and of illness at the workplace, using a bivariate probit regression model. Thirdly, after the indication of some diagnostic tests, we run probit models for the work accident/illness restricted to a subsample: the workers with at most three years of tenure.

[1] The first legislation on work safety in Italy has its origins years ago. After the innovative approach of the *Statuto dei Lavoratori* of 1970, in which preventive protection is established, the Legislative Decree n. 277 of 1991 represents the first major implementation of European Union Directives on safety at work in Italy. Risks from asbestos, lead, and noise are considered. A significant step forward was made by the Legislative Decree n. 626 of 1994, which incorporates several European Union Directives on safety at work. Later, in 2008 the Legislative Decree n. 81 was enacted containing the *Testo Unico* on safety and health at the workplace. This is a comprehensive corpus of legislation on this subject. Further revisions are then made in 2009 by the Legislative Decrees n. 106 and n. 180. The analysis presented in this work refers, as specified below, to the Labour Force Survey carried out in the second quarter of 2007, so, at that time, the relevant legislation was the Legislative Decree n. 626 of 1994.

2. Data

The data used in the analysis come from the Labour Force Survey[2] carried out by Istat, the Italian National Institute of Statistics.[3] In particular, the data refer to the second quarter of 2007, when an "ad hoc" module devoted to safety and health at work was added to the standard information contained in the Survey.[4]

The survey collects various kinds of information on jobs, firms and on the personal characteristics of employees. In addition, the survey provides data on working conditions (that we assemble to job characteristics) and on recent work accidents and illnesses. The reference period for work accident and work illness is 12 months. This could lead to an undervaluation of job insecurity because, as reported in other studies (Landen and Hendricks 1995; Oh and Shin 2003), the number of accidents reported decreases as the time gap between the interview date and the actual date of the accident increases. In addition to that, the true extent of the problem of insecurity at the workplace is underestimated since fatal work injuries and fatal work diseases are not considered in our data. On the other hand, our dataset does not suffer from a systematic underreporting bias. In fact, Istat collects the information directly at the household residence ensuring statistical confidentiality.

The "ad hoc" module contains a lot of information related to safety at work for each worker. In particular:

- non-fatal accidents that occurred at the workplace in the preceding twelve months;
- non-fatal illnesses or health problems caused or exacerbated by working in the preceding twelve months;
- non-fatal accidents that occurred on the way to work in the preceding twelve months.

A part of the "ad hoc" module deals with worker subjective perception to exposure to health risk factors. The risk factors considered are both physical and psychological. Among the physical risk factors, there are: exposure to dust, fumes, smoke, chemicals; exposure to excessive noise or vibration; bad posture induced by work requirements, movement of heavy loads; and exposure to a general risk of injury. Among the risk factors that may affect the psychological balance of workers there are excessive workload; phenomena of bullying or discrimination; and exposure to threats or physical violence.

[2] The survey is entirely comparable (concerning the organization, the information collected and the definitions used) with those carried out in other EU countries. In fact, since 1999 Eurostat requires to all member states to carry out quarterly interviews with the same scheme.

[3] Istat collects the information each quarter by interviewing a sample of nearly 77,000 households (approximately 300,000 in one year), representing 175,000 individuals who are resident in Italy, even if they are temporarily abroad. For further information, see the Istat website.

[4] The "ad hoc" module was included in the Labour Force Survey by all Members of European Union in the second quarter of 2007 to provide an assessment of the effects of the European strategy for health and safety at work.

In our analysis we use micro-data referring only to employees with open-ended and fixed-term contracts, excluding individuals with other kinds of labour relations and unemployed individuals. As said in the introduction, we are interested in both work accidents and illnesses, our dependent variables. In particular, we define work accident as an episode of injury that occurs at work which leads to a disability, total or partial, permanent or temporary. Similarly, work illness is defined as a disease that occurs because of work and is determined from prolonged exposure to a harmful agent.[5] We examine also the determinants of the frequency of work accidents and work illnesses, defined as number of accidents and illnesses experienced by each worker.[6]

In addition to the type of contract, the determinants of accident/illness probabilities are grouped in three categories: job, firm and personal characteristics. As seen in the introduction, it seems that workers with fixed-term contracts may have a higher number of work accidents or illnesses. In order to control for job characteristics, we look at working time (full-time/part-time, overtime hours, and shift work), at working conditions (described above), and at professional position. The professional position is categorized in three classes: manager or director; white collar; and blue collar or apprentice. Amongst firm characteristics we control for two variables: establishment size and main activity sector of the firm. The last relevant set of variables is represented by personal characteristics. Among these we include gender, age, birthplace, number of household members, civil status, and region of residence. We also include information on accidents occurring on the way to work as done in the study by Guadalupe (2003). The introduction of this variable allows the possibility of capturing the personal proneness to accident. In this way, we are able to correct for a possible ability bias in the contract coefficient. Moreover, human capital is taken into account through some variables: years of education, recent training activity (on the job), current job tenure, indication whether it is the first job, indication whether the worker is looking for another job.

The total number of employees in our sample is 45,131, of which 44,620 answered questions on work accidents and 44,489 on work illnesses. Table A1 in appendix provides descriptive statistics for the entire sample and for the workers who experienced accident or illness, reporting the mean and the standard deviation of the variables used in the analysis, grouped by job, firm and personal characteristics.

Table 1 shows the occurrence of work accident and illness by contract type. The raw percentage of workers that had experienced a work accident is similar for both types of contract (2.7% for open-ended contracts and 2.5% for fixed-term contracts), while the rate of work illness is greater for open-ended contracts (7.6%) than for fixed-term contracts (5.6%).

[5] In the regressions, work accident/work illness is a dichotomous variable pointing out if the worker had experienced an accident/illness at work during the previous 12 months.

[6] Repeated work accidents/work illnesses is a dichotomous variable pointing out if the worker had experienced more than one accident/illness (a single accident/illness) during the previous 12 months.

Table 1 – Incidence (%) of work accident and illness by contract type

	Accident	Illness
Contract type of the workers		
Open-ended	2.7	7.6
Fixed-term	2.5	5.6
Total	2.7	7.3

Source: 2007 second quarter Istat Labour Force Survey

These preliminary results are unavoidably raw because they do not take into account all of the variables that could influence the probability to have accidents/illnesses. Therefore by exploiting the rich dataset at our disposal, in the next sections we use different econometric techniques in order to produce ceteris paribus results. Our main aim is to understand the determinants of work accident/illness by assessing which among workers' job, firm, and personal characteristics are significant variables to take into consideration.

3. Econometric specification

We present here a brief discussion of the methodologies we employ to derive the results presented in subsequent sections. Good sources to study in depth and clarify these concepts are Cameron et al. (2005) and Greene (2007).

In order to investigate the probability of a work accident (the same holds for an illness), we assume there exists a latent variable that represents the danger of the work experience. In addition to that, we assume this variable is determined by

$$y_i^* = \alpha d_i + \beta' X_i + \varepsilon_i, \tag{1}$$

where the scalar d_i and the vector X_i are the covariates (d_i is our main variable of interest, the dummy Fixed-term contract; X_i contains the control variables). For the characteristics of the individual i, the scalar α and the vector β are the parameters, and $\varepsilon_i \sim N(0,1)$ is the error term independent of d_i and X_i. Since we cannot observe y_i^*, however, we assume that the observable binary variable y_i, that records if the individual declares a work accident, is defined as:

$$y_i = \begin{cases} 1 & if\ y_i^* > 0 \\ 0 & if\ y_i^* \leq 0 \end{cases}. \tag{2}$$

Since ε_i is normally distributed, we can write

$$P(y_i = 1 | d_i, X_i) = P(\alpha d_i + \beta' X_i + \varepsilon_i > 0 | d_i, X_i) = \Phi(\alpha d_i + \beta' X_i), \tag{3}$$

where Φ denotes the standard normal distribution function. Furthermore,

$$P(y_i = 0 | d_i, X_i) = 1 - \Phi(\alpha d_i + \beta' X_i). \tag{4}$$

By (3) and (4) it is easy to obtain the log-likelihood function $\mathcal{L}(\alpha, \beta)$. Maximizing it we get the maximum likelihood estimation of (α, β), that is the estimation of the probit model.[7] The coefficients presented in Tables 2, 3, and 5 are obtained in this way.

In order to obtain a complete representation of job safety, we finally do inference, treating the two phenomena in a joint manner. A natural extension of the probit model for two equations with correlated disturbances is the bivariate probit model. We can define the unobserved latent variables, that represent how dangerous and how unhealthy the work experience is, as:

$$y_{1i}^* = \alpha_1 d_{1i} + \beta_1' X_{1i} + \varepsilon_{1i}, \quad y_{2i}^* = \alpha_2 d_{2i} + \beta_2' X_{2i} + \varepsilon_{2i}, \tag{5}$$

where $\varepsilon_{1i}, \varepsilon_{2i} \sim N(0,1)$ have a correlation equal to ρ. The observed variables, that record if the individual declares an accident and if she/he declares an illness related to the job, are:

$$y_{1i} = \begin{cases} 1 & if\ y_{1i}^* > 0 \\ 0 & if\ y_{1i}^* \leq 0' \end{cases} \quad y_{2i} = \begin{cases} 1 & if\ y_{2i}^* > 0 \\ 0 & if\ y_{2i}^* \leq 0 \end{cases}. \tag{6}$$

All the possible outcomes are:

$$\begin{aligned} p_{jk,i} &= P(y_{1i} = j, y_{2i} = k | d_{1i}, X_{1i}, d_{2i}, X_{2i}) = \\ &= \Phi_2[(2j-1)(\alpha_1 d_{1i} + \beta_1' X_{1i}), (2k-1)(\alpha_2 d_{2i} + \beta_2' X_{2i}), \rho], \end{aligned} \tag{7}$$

where $\Phi_2(z_1, z_2, \rho)$ denotes the standard bivariate normal cumulative distribution function for (z_1, z_2) with zero means, unit variances, and correlation ρ. We can maximize the log-likelihood function $\mathcal{L}(\alpha_1, \beta_1, \alpha_2, \beta_2)$ we get from (7). The result is the maximum likelihood estimation of $(\alpha_1, \beta_1, \alpha_2, \beta_2)$, also known as the estimation of the bivariate probit model. The coefficients presented in Table 4 are found in this way.

4. Results

We are interested in explaining job safety as a broad phenomenon. However, first we focus on a particular variable: the type of contract. Therefore, in order to capture the contract effect, in every model we use a dummy variable that indicates if the employee is hired with a fixed-term contract or not. In addition, we control for job, firm, and personal characteristics.

[7] As detailed in Cameron et al. (2005: 472), the advantage of the probit model compared to the logit model is that we can employ a latent normal random variable (that represents the danger of the work experience) in order to obtain a more natural interpretation. This choice does not influence the empirical results in a significant way.

The probability of accident and illness at the workplace. Table 2 shows the results concerning the probability of suffering an accident or an illness at the workplace. Table 2 reports the estimated coefficients and the robust standard errors.[8] As we can see from the significant joint Wald tests on the regressions, the models succeed in explaining the probability of the dependent variables. The significant likelihood ratio test on heteroskedasticity[9] motivates the choice of the robust[10] standard errors used.

We focus first on work accidents. An important finding indicates that the type of contract does not seem to affect the likelihood of having an accident. Indeed, even though the estimated coefficient for the fixed-term contract dummy variable has a positive sign, it is not statistically significant.[11] The variables that therefore influence safety at work seem to be other than contract. In particular, we can notice that job and personal characteristics, and, in a lesser extent, firm characteristics can affect the probability to experience a work accident. Among job characteristics, being a worker with a full-time contract as well as doing overtime hours and shift work (as measures of work intensity) increases the probability of having an accident. Clearly, expanding working time, *ceteris paribus*, increases the chance of accident. When looking at working conditions, the variables considered in the analysis show positive and statistically significant coefficients. For example, the probability of having an accident is 2.9% higher, on the average, for those workers that feel exposed to risk of injury. The information coming from the professional position dummies confirms the intuition that blue collar workers are exposed to higher risks (+1.7%) than managers or directors. Firm characteristics seem to affect lightly the probability of injury. In particular, on the one side the variable establishment size is not significant even if the sign is positive (larger size brings more accidents). On the other side, the categorical variable sector of activity presents a positive joint significance but it is not possible to isolate the effect of all single sectors. All we can say is that employment in other sectors increases the probability of work accidents in respect to the agriculture sector by about 0.8%.

[8] We present, for tables 2-5 in the paper, only one specification of the diverse models we tested, being the results robust to these various specifications (the significant variables we find in the tables continue to be significant and with the same sign for all the model specifications). The results of these various model specifications are available from the authors upon request.

[9] For all the heteroskedasticity tests in the paper we use maximum-likelihood heteroskedastic probit models. They are generalizations of the probit models in which the normal CDF has no longer a variance fixed at 1 but can vary as a multiplicative function of the independent variables (Harvey, 1976). The likelihood-ratio test of heteroskedasticity tests the full model with heteroskedasticity against the full model without.

[10] We use the robust or sandwich estimator of variance. This estimator is robust to some types of misspecification so long as the observations are independent (Greene, 2007).

[11] Looking at the average effects (obtained by computing the variation of the estimated probability for the mean individual) we can say that the average individual with a fixed-term contract instead of an open-ended one would have a 0.017% higher probability to incur in a work accident.

Table 2 – Probability of accident and illness at the workplace – Probit

	Accident		**Illness**	
Independent Variable	*Coefficient*	*Robust S E*	*Coefficient*	*Robust S E*
Fixed-term contract	0.004[a]	(0.045)	0.028[b]	(0.036)
Constant	-2.762***	(0.162)	-2.337***	(0.181)
	Job characteristics			
Full-time contract	0.138***	(0.049)		
Overtime hours	0.090**	(0.044)	0.132***	(0.034)
Shift work	0.177***	(0.031)	0.072***	(0.025)
Manager or director as reference category[c]				
White collar worker	0.098	(0.065)		
Blue collar worker or apprentice	0.369***	(0.071)		
Exposure to dangers such as dust, etc.			0.161***	(0.030)
Noisy workplace	0.077**	(0.036)	0.247***	(0.031)
Bad posture induced by work	0.172***	(0.032)	0.522***	(0.026)
Feeling exposed to risk of injury	0.486***	(0.033)	0.114***	(0.029)
Excessive workload			0.467***	(0.026)
Feeling exposed to bullying or discrimination	0.227***	(0.051)	0.566***	(0.036)
Feeling exposed to threats or physical violence	0.220***	(0.083)	0.232***	(0.064)
	Firm characteristics			
Establishment size	0.032	(0.033)	0.096***	(0.027)
Agriculture as reference category[d]				
Industry excluding constructions	0.086	(0.089)	-0.073	(0.068)
Constructions	0.095	(0.094)	-0.035	(0.074)
Retail	0.068	(0.096)	-0.107	(0.074)
Other activities	0.184**	(0.088)	0.010	(0.066)
	Personal characteristics			
Current job tenure	7.2e-04*	(4.1e-04)	6.0e-04***	(1.1e-04)
Square of current job tenure	-2.0e-06**	(9.9e-07)		
First job	-0.059	(0.036)	-0.104***	(0.027)
Looking for another job	0.204***	(0.051)	0.340***	(0.042)
Number of household members			-0.019*	(0.011)
Male	0.140***	(0.033)	-0.135***	(0.024)
Born in Italy	-0.053	(0.047)	-0.009	(0.043)
Years of education			-0.048**	(0.024)
Square of years of education	-5.6e-04**	(2.2e-04)	0.002**	(9.7e-04)
Educational activities in last four weeks			0.200***	(0.041)
Accident occurred on the way to work	0.306***	(0.103)	0.457***	(0.078)
Age class	5.2e-04	(0.016)	0.109***	(0.014)
North West as reference category[e]				
North East	0.062*	(0.037)	0.085***	(0.030)
Centre	-0.005	(0.041)	-0.011	(0.034)
South	-0.112***	(0.041)	0.088***	(0.031)
Islands	-0.111**	(0.054)	-0.019	(0.041)
Executive or intellectual occupation as reference category[f]				
Technical position			0.071*	(0.042)
Office clerk and qualified occupation			0.053	(0.046)
Craftsman and operator of industrial machinery			-0.003	(0.050)
Unmarried as reference category[g]				
Married			0.102***	(0.031)
Separated or divorced			0.079	(0.049)
Widow/widower			0.049	(0.084)
Number of obs.	43006		39471	
Regression Wald test	$chi^2(29) = 1248.04$***		$chi^2(36) = 3316.33$***	
Pseudo R^2	0.112		0.172	
Heteroskedasticity LR test	$chi^2(29) = 1218.12$***		$chi^2(36) = 3520.83$***	
Nonlinearities (spline) in current job tenure	$chi^2(3) = 13.49$***		$chi^2(3) = 2.87$	

Average effects: [a]0.017% [b]0.288%

Professional position dummies: [c]$chi^2(2) = 56.30$***

Sector dummies: [d]$chi^2(4) = 12.77$** [e]$chi^2(4) = 14.14$***

Geographic area dummies: [f]$chi^2(4) = 21.22$*** [g]$chi^2(4) = 20.13$***

Occupation dummies: [h]$chi^2(3) = 7.12$*

Civil status dummies: [i]$chi^2(3) = 11.41$***

Significance levels: * 0.10 ** 0.05 *** 0.01

Source: 2007 Istat Labour Force Survey

When looking at personal characteristics, we can say that gender affects the probability of having an accident. Males, on average, have a 0.6% higher risk of accidents than females. At the end of Table 2 it is possible to see a significant Wald test for the nonlinearity of current job tenure obtained through a spline approximation.[12] Therefore, a nonlinear specification for that variable is needed. In order to obtain readable results, instead of using the spline approximation we estimate the coefficients (in the probit model) of a second order polynomial of current job tenure which is plotted in Figure 1.[13] The probability of work accident increases as the current job tenure rises until 180 months (15 years), the point in which it reaches the maximum. After that the probability decreases and reaches its minimum for the maximum level of tenure. In addition, the accident probability is higher for people with fewer years of education. Workers who are looking for another job seem to have greater likelihood (+1.1%) of incurring in work accidents than their colleagues. Indeed, poor motivation, lack of satisfaction and desire for a different job imply less effort and less care at work. We also include, among personal characteristics, the geographical area of residence. This control variable captures specific socio-cultural values otherwise unobserved (Hernanz and Toharia 2006). The probability of work injury decreases going from North to South. This trend may be associated with the different levels of unemployment throughout the country (higher in South regions). In fact, as underlined in other works (Guadalupe 2003, p. 352), a high rate of unemployment can have a negative impact on accidents because it implies lower activity. As said above, we introduce a dummy for the accidents experienced by workers on the way to work as a proxy of their degree of proneness to accidents: the worker that experiences accidents on the way to work has more likelihood (+1.8%) also to have an accident at the workplace. Finally, the workers' place of birth (Italy or abroad) and the workers age are not statistically significant.

When focusing on work illness, we first confirm the result about the type of contract. As for the work accidents, the estimated coefficient for the dummy variable fixed-term contract has a positive and not significant sign.[14] As seen for the model on work accident, job, firm, and personal characteristics help to explain the likelihood of work illness. Among job characteristics, working conditions significantly affect the probability of illness; for instance, workers with bad posture induced by work

[12] In order to test the nonlinearity hypothesis for the variable current job tenure, we model complex nonlinear relationships with restricted cubic splines (Dupont 2009). Afterward, we consider a semiparametric extension of the probit model with the spline approximation for current job tenure (Hastie, Tibshirani, and Friedman 2001). The significant joint test on the coefficients of the spline approximation (that add to the original values of the variable) in this model rejects the hypothesis of linearity.

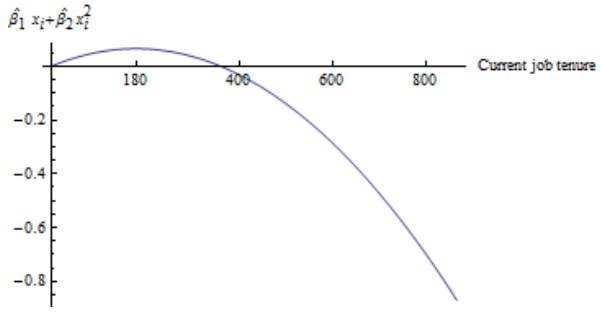
[13] The partial effect of the second order polynomial of current job tenure in the probit estimation is $\frac{\partial \Phi(\alpha d_i + \beta' X_i)}{\partial x_i} = \phi(\alpha d_i + \beta' X_i)(\beta_1 + 2\beta_2 x_i)$, where $\phi(.)$ is the normal density function, x_i is the variable current job tenure, β_1 is its coefficient for the linear part, and β_2 is its coefficient for the quadratic part. Therefore, the maximum of the polynomial is $\frac{-\beta_1}{2\beta_2}$. In the figure we plot the polynomial with the estimated betas: $\hat{\beta}_1 x_i + \hat{\beta}_2 x_i^2$.

[14] The average individual with a fixed-term contract instead of an open-ended one would have a 0.288% higher probability to incur in a work illness.

requirements or who are subject to excessive workload endure a 6.8% and 6.2% higher risk of illness respectively. Also psychological working conditions prove to have a large importance in determining work illness: feeling exposed to bullying or discrimination increases the risk of illness of 8.5%. When looking at firm characteristics, employment in larger firms increases the probability of work illness. Among personal characteristics, the coefficient of current job tenure indicates that illness probability is higher for people with longer job tenure. This finding can be explained by a prolonged exposure to health risks linked to bad working conditions. The same positive relationship exists with the age of workers. Work illness is less likely to occur to males (-1.4%). Looking at workers' area of residence, the geographic dummies are jointly significant and being in the South leads to a higher probability (about 1%) of illness as compared to being in the North East. We also find significant the occupational dummies jointly considered, even if it is not possible to differentiate among all occupational groups. In particular, only workers in technical occupations experience a higher probability of work illness (+0.7%) in comparison to workers engaged in executive or intellectual jobs.

The main findings of our analysis, differing from other works (Guadalupe 2003), highlight that work safety is not affected by workers' type of contract. Moreover, in line with Amuedo-Dorantes (2002), both work accident and work illness seem to be influenced mainly by working conditions and by several personal characteristics.

Figure 1 – Current job tenure (expressed in months) effect ($\hat{\beta}_1 x_i + \hat{\beta}_2 x_i^2$) on accident at the workplace – Table 2



Our analysis on work safety continues with Table 3 that shows statistical inference regarding the repetition of accidents/illnesses within the 12 month reference. In particular, it presents the estimated coefficients and robust standard errors for two probit regression models. The dependent variable is a dummy variable that indicates if the employee experienced more than one as opposed to only one accident/illness. This analysis is useful in order to understand the causes of the repetition of accidents and illnesses. In fact, in our sample, among 1709 cases of workers that experienced work accident about 8.1% reported more than one episode; and among 8126 workers that suffered work illness about 13.3% cases reported more than one illness. Looking at the significance of the regression Wald tests we can say that our regressions explain the phenomenon studied. The heteroskedasticity likelihood tests suggest the use of robust standard errors to do inference.

Table 3 – Probability of repeated accidents and illnesses at the workplace – Probit

	Accidents		Illnesses	
Independent Variable	*Coefficient*	*Robust S E*	*Coefficient*	*Robust S E*
Fixed-term contract	-0.064[a]	(0.156)	0.038[b]	(0.102)
Constant	-0.622***	(0.232)	-1.449***	(0.236)
			Job characteristics	
Full-time contract			0.186*	(0.107)
Overtime hours	-0.134	(0.172)	0.046	(0.088)
Shift work	-0.044	(0.125)	0.009	(0.068)
Manager or director as reference category			[c]	
White collar worker			0.209	(0.131)
Blue collar worker or apprentice			-0.033	(0.150)
Exposure to dangers such as dust, etc.			0.166**	(0.071)
Bad posture induced by work			0.114*	(0.069)
Feeling exposed to risk of injury	0.280**	(0.123)	0.218***	(0.072)
Excessive workload	0.295**	(0.130)	0.194***	(0.065)
Feeling exposed to bullying or discrimination			0.240***	(0.072)
			Firm characteristics	
Establishment size	-0.049	(0.131)	-0.139*	(0.080)
			Personal characteristics	
First job	-0.349**	(0.147)		
Looking for another job			0.254**	(0.099)
Number of household members			-0.045	(0.027)
Male	-0.290**	(0.125)	-0.138**	(0.069)
Born in Italy	-0.211	(0.160)	-0.303***	(0.108)
Square of age class	-0.032***	(0.007)	0.008**	(0.004)
North West as reference category			[d]	
North East			0.271***	(0.087)
Centre			0.067	(0.100)
South			0.168*	(0.091)
Islands			0.001	(0.126)
Executive or intellectual occupation as reference category			[e]	
Technical position			-0.187	(0.135)
Office clerk and qualified occupation			0.090	(0.138)
Craftsman and operator of industrial machinery			0.004	(0.153)
Number of obs.	1180		2924	
Regression Wald test	$chi^2(10) = 46.84$***		$chi^2(24) = 130.03$***	
Pseudo R^2	0.065		0.061	
Heteroskedasticity LR test	$chi^2(10) = 44.30$***		$chi^2(24) = 52.36$***	

Average effects: [a]-0.774% [b]0.759%
Professional position dummies: [c]$chi^2(2) = 8.59$**
Geographic area dummies: [d]$chi^2(4) = 12.56$**
Occupation dummies: [e]$chi^2(3) = 9.25$**
Significance levels: * 0.10 ** 0.05 *** 0.01
Source: 2007 Istat Labour Force Survey

Overall, the findings show that the type of contract does not seem to affect the probability of the repetition of accidents/illnesses at the workplace. The variable fixed-term contract is not significant in either case, even if its sign is negative for work accidents and positive for work illnesses; for the average observation, having a fixed-term contract reduces the likelihood of repeated work accidents by 0.774% and increases the likelihood of repeated work illnesses by 0.759%.

When focusing on work accidents, it emerges that workers that feel exposed to risk of injury or to excessive workload seem to face a higher risk of repeated accidents (respectively +3.4% and +4.2%). On the other hand, workers at the first job experience have a lower risk of repeated accidents (-3.8%), as well as men (-4.1%) and older workers (-0.4%). When looking at work illnesses, all of the variables concerning the working conditions have a negative impact on the risk of illnesses. For instance,

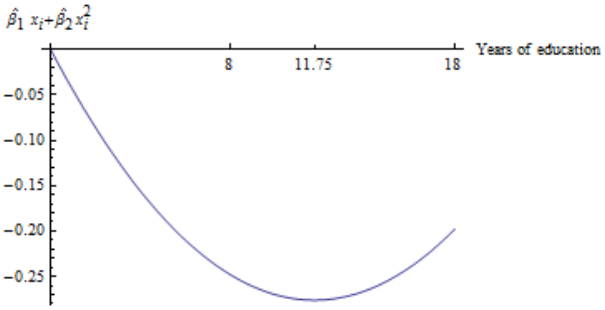
exposure to dangers such as dust, fumes, chemicals, etc. increases the likelihood of repeated illnesses by 3.4%, and feeling exposed to bullying or discrimination augments the probability by 5.1%.

The joint probability of accident and illness at the workplace. We examine the two elements of work safety in a unified way as a robustness check for our results. We use the bivariate probit regression model, therefore, in order to jointly estimate the probability of accident and of illness at the workplace. In this way, we allow for covariance in the unobservables of the two equations. As we can see in Table 4, a positive and significant ρ means that there are unobservable variables that positively affect the two probabilities. This finding suggests that there is something similar to an unobserved proneness to have an accident that also positively affects the proneness to have an illness, in other words these two phenomena are better studied together.

In comparison to Table 2, Table 4 has results broadly in line with what was observed before. The variable of interest, fixed-term contract, has now a negative coefficient for the accidents, but it remains not significant. At the end of the table we present the average partial effects for this variable: workers that have a fixed-term contract have about a 0.2% lower probability to have accidents vis-à-vis workers with an open-ended contract.[15]

In the model of illness we find significant a second order polynomial to express the effect of the years of attained education. In figure 2 we plot this polynomial with the estimated coefficients. As we can see workers with approximately 12 years of education (in Italy, 13 years correspond to the completion of the high-school) experience the lowest probability of having an illness at the workplace.

Figure 2 – Years of education effect ($\hat{\beta}_1 x_i + \hat{\beta}_2 x_i^2$) on illness at the workplace – Table 4



[15] Differently from the average effects quoted in the previous tables, the average partial effect is obtained by calculating the partial effect for all the observations in the sample and subsequently taking the average of these partial effects (Jones 2007). The result is less artificial than the average effect since we have dummies as explanatory variables.

Table 4 – Joint probability of accident and illness at the workplace – Bivariate probit

	Accident		**Illness**	
Independent Variable	*Coefficient*	*Robust S E*	*Coefficient*	*Robust S E*
Fixed-term contract	-0.038[a]	(0.045)	0.029[b]	(0.036)
Constant	-2.680***	(0.168)	-2.335***	(0.181)
		Job characteristics		
Full-time contract	0.129**	(0.051)		
Overtime hours	0.085*	(0.046)	0.132***	(0.034)
Shift work	0.157***	(0.033)	0.073***	(0.025)
Manager or director as reference category[c]				
White collar worker	0.065	(0.067)		
Blue collar worker or apprentice	0.339***	(0.074)		
Exposure to dangers such as dust, etc.			0.161***	(0.030)
Noisy workplace	0.084**	(0.037)	0.247***	(0.031)
Bad posture induced by work	0.186***	(0.034)	0.521***	(0.026)
Feeling exposed to risk of injury	0.490***	(0.035)	0.114***	(0.029)
Excessive workload			0.466***	(0.026)
Feeling exposed to bullying or discrimination	0.250***	(0.053)	0.567***	(0.036)
Feeling exposed to threats or physical violence	0.172*	(0.089)	0.232***	(0.064)
		Firm characteristics		
Establishment size	0.037	(0.035)	0.096***	(0.027)
Agriculture as reference category[d]				
Industry excluding constructions	0.102	(0.094)	-0.073	(0.068)
Constructions	0.071	(0.099)	-0.035	(0.074)
Retail	0.068	(0.101)	-0.107	(0.074)
Other activities	0.188**	(0.093)	0.010	(0.066)
		Personal characteristics		
Current job tenure			6.0e-04***	(1.1e-04)
First job	-0.065*	(0.035)	-0.104***	(0.027)
Looking for another job	0.182***	(0.055)	0.339***	(0.041)
Number of household members			-0.019*	(0.011)
Male	0.136***	(0.035)	-0.135***	(0.024)
Born in Italy	-0.039	(0.050)	-0.009	(0.043)
Years of education			-0.047**	(0.024)
Square of years of education	-5.6e-04**	(2.3e-04)	0.002**	(9.7e-04)
Educational activities in last four weeks			0.201***	(0.041)
Accident occurred on the way to work	0.316***	(0.106)	0.458***	(0.078)
Age class	-0.008	(0.014)	0.109***	(0.014)
North West as reference category[f]				[g]
North East	0.069*	(0.038)	0.085***	(0.030)
Centre	-0.010	(0.044)	-0.010	(0.033)
South	-0.099**	(0.043)	0.088***	(0.031)
Islands	-0.088	(0.056)	-0.019	(0.041)
Executive or intellectual occupation as reference category[h]				
Technical position			0.071*	(0.042)
Office clerk and qualified occupation			0.054	(0.046)
Craftsman and operator of industrial machinery			-0.004	(0.050)
Unmarried as reference category[i]				
Married			0.103***	(0.031)
Separated or divorced			0.078	(0.049)
Widow/widower			0.047	(0.085)
Rho	.091	Wald test: $chi^2(1) = 13.94$***		
Number of obs.	39471			
Regression Wald test	$chi^2(63) = 4416.92$***			

Average partial effects: [a]-0.207% [b]0.338%

Professional position dummies: [c]$chi^2(2) = 49.74$***

Sector dummies: [d]$chi^2(4) = 11.58$** [e]$chi^2(4) = 13.97$***

Geographic area dummies: [f]$chi^2(4) = 17.00$*** [g]$chi^2(4) = 19.95$***

Occupation dummies: [h]$chi^2(3) = 7.16$*

Civil status dummies: [i]$chi^2(3) = 11.57$***

Significance levels: * 0.10 ** 0.05 *** 0.01

Source: 2007 Istat Labour Force Survey

The probability of accident and illness at the workplace within three years of tenure. The last robustness check we perform comes from a test of misspecification. A RESET test on the two models of Table 2 shows evidence of misspecification.[16] In Italy the contractual situation changes significantly after three years of tenure in the same firm. In fact, the Legislative Decree n. 368 of 2001 providing the legal framework for fixed-term contracts, states that the total duration of a fixed-term relationship cannot exceed 36 months.[17] Therefore, we perform a poolability test for workers with tenure within and over three years for the two models of Table 2. The results conclusively reject the hypothesis of equal parameters.[18] Hence, we restrict our analysis to only one of the two subsets of our dataset. In Table 5 we present the results of the probit models for the work accident/illness, having restricted the dataset only to workers with tenure up to three years. We consider this table very reliable since the RESET tests on the models run on this restricted sample do not find misspecification.[19]

When looking for the differences between Table 2 and Table 5 we can see that the variable fixed-term contract continues to be not significant in explaining the probability of incurring in an accident and the probability of incurring in an illness. Regarding the probability of an accident we note that the full-time contract, overtime hours, noisy workplace, feel exposed to threats or physical violence, sector dummies, current job tenure, square of years of education variables are no more significant. Furthermore where the probability of an illness is concerned we note that the overtime hours, shift work, exposure to dangers such as dust, establishment size, sector dummies, number of household members, civil status dummies variables are also no more significant. Interestingly, we find that the square of current job tenure is negatively significant. In other words, within three years of tenure, the more months passed working correspond to a lower probability of suffering an illness related to work. We conclude noting that many variables about the working conditions and the variables regarding shift work (only for the accident), professional position dummies (only for the accident), first job, looking for another job, being male, years of education (only for the illness), accident occurred on the

[16] $chi^2(1) = 15.10***$, $chi^2(1) = 27.77***$

[17] By virtue of article 4 of Legislative Decree n. 368/2001, the duration of an employment contract may be extended only once if its initial duration was less than three years; but, in that event, the total duration of that contract may not exceed three years. Article 10 contains a list of cases to which the rules for fixed-term contracts do not apply. For example, the 36 month rule does not apply to fixed-term employment relationships with manager or director, whose maximum length is five years. In practice, article 5 of Legislative Decree n. 368/2001 allowed the possibility of several successive fixed-term contracts, respecting the period of interruption, set twenty days from the date of expiration. This rule enabled the elusive behaviors of the employers, by allowing the practical use of fixed-term contracts for a period exceeding 36 months. Law 247, 24 December 2007, prevents this practice, expressly providing that, although the time limit of interruption between two subsequent fixed-term contracts remains valid, the employment relationship between the parties cannot exceed a total of 36 months, including extensions and renewals, regardless of outages between a contract and another.

[18] $chi^2(30) = 42.79*$, $chi^2(37) = 60.90***$

[19] $chi^2(1) = 0.50$, $chi^2(1) = 0.32$

way to work, age class (only for the illness), geographic area dummies, and occupation dummies (only for the illness) continue to be significant and have the same sign on the coefficients in explaining work safety.

Table 5 – Probability of accident and illness at the workplace within three years of tenure – Probit

	Accident		**Illness**	
Independent Variable	*Coefficient*	*Robust S E*	*Coefficient*	*Robust S E*
Fixed-term contract	0.074[a]	(0.055)	5.0e-04[b]	(0.049)
Constant	-2.572***	(0.208)	-1.972***	(0.332)
		Job characteristics		
Overtime hours	0.064	(0.086)	0.102	(0.072)
Shift work	0.183***	(0.062)	0.034	(0.055)
Manager or director as reference category		[c]		
White collar worker	0.050	(0.184)		
Blue collar worker or apprentice	0.348**	(0.176)		
Exposure to dangers such as dust, etc.	0.140**	(0.065)		
Noisy workplace			0.221***	(0.061)
Bad posture induced by work	0.120*	(0.063)	0.591***	(0.054)
Feeling exposed to risk of injury	0.533***	(0.065)	0.249***	(0.059)
Excessive workload			0.460***	(0.054)
Feeling exposed to bullying or discrimination	0.484***	(0.098)	0.505***	(0.081)
Feeling exposed to threats or physical violence			0.301**	(0.148)
		Firm characteristics		
Establishment size	-0.052	(0.056)	0.009	(0.048)
		Personal characteristics		
Square of current job tenure			-1.0e-04**	(5.0e-05)
First job	-0.147*	(0.080)	-0.268***	(0.072)
Looking for another job	0.132*	(0.076)	0.317***	(0.060)
Male	0.287***	(0.061)	-0.174***	(0.049)
Born in Italy	-0.051	(0.075)	0.064	(0.069)
Years of education			-0.105**	(0.049)
Square of years of education			0.005**	(0.002)
Educational activities in last four weeks			0.255***	(0.092)
Accident occurred on the way to work	0.320*	(0.179)	0.487***	(0.153)
Age class			0.124***	(0.021)
Square of age class	-0.005	(0.003)		
North West as reference category		[d]		[e]
North East	0.069	(0.071)	0.203***	(0.061)
Centre	-0.012	(0.079)	-0.007	(0.070)
South	-0.251***	(0.082)	0.070	(0.064)
Islands	-0.246**	(0.103)	-0.182**	(0.088)
Executive or intellectual occupation as reference category				[f]
Technical position			-0.006	(0.097)
Office clerk and qualified occupation			-0.024	(0.102)
Craftsman and operator of industrial machinery			-0.145	(0.107)
Number of obs.	12368		12167	
Regression Wald test	$chi^2(20) = 374.64$***		$chi^2(27) = 783.70$***	
Pseudo R^2	0.133		0.180	
Heteroskedasticity LR test	$chi^2(20) = 388.80$***		$chi^2(27) = 835.14$***	

Average effects: [a]0.285% [b]0.003%

Professional position dummies: [c]$chi^2(2) = 19.81$***

Geographic area dummies: [d]$chi^2(4) = 20.38$*** [e]$chi^2(4) = 25.99$***

Occupation dummies: [f]$chi^2(3) = 5.38$

Significance levels: * 0.10 ** 0.05 *** 0.01

Source: 2007 Istat Labour Force Survey

5. Conclusion

Work safety is a relevant issue at stake in modern political debates. Widespread conception of the matter is that the contractual position of the worker is a relevant determinant for what concerns accidents and illnesses. In order to investigate these ideas, we employ individual level data from the 2007 Italian Labour Force Survey and its *ad hoc* module on work safety.

We performed probit regressions for the occurrence and the repetition of accidents and illnesses at the workplace. Medical literature finds a strong connection between temporary work and psychological morbidity (Virtanen et al. 2005; Ferrie et al. 2008).Our results, however, seem to be in line with the majority of works in economic literature (Amuedo-Dorantes 2002; Hernanz and Toharia 2006). This paper shows that work safety is mainly affected by working conditions, and to a lesser extent, by personal characteristics. On the contrary, workers' type of contract seems to not influence accidents and illnesses at the workplace.

By using a bivariate probit, we confirmed the previous results and we found unobservable factors that affect in the same direction the probability of incurring in work accident and work illness. Some diagnostic tools and Italian legislation suggest us to run probit regressions restricted to the sample of workers within three years of tenure. Even though some variables do not seem to matter anymore in this last model specification, the findings on the main variables continue to hold.

All the model specifications we used reveal the importance of working conditions for non-fatal accidents and non-fatal illnesses at the workplace. Assuming that these findings hold also for fatal accidents and illnesses (not taken in account in this paper), the improvement of working conditions should be the priority for policy on work safety. This means: the noise reduction at the workplace, reducing excessive workload, correct posture requirements, and the prohibition of behaviour connected to bullying, harassment or discrimination.

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7. Appendix

Table A1 – Descriptive statistics of variables used in the analysis

	All workers		Worker with accident or illness		Worker with no accidents and no illness	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Dependent variables						
Work accident	0.027	0.162	0.283	0.450	0	0
Repeated work accidents			0.922	0.268		
Work illness	0.073	0.261	0.765	0.424	0	0
Repeated work illnesses			0.869	0.337		
Job characteristics						
Fixed-term contract	0.139	0.345	0.112	0.315	0.141	0.348
Full-time contract	0.858	0.349	0.896	0.306	0.854	0.353
Overtime hours	0.085	0.278	0.133	0.340	0.080	0.271
Shift work	0.222	0.416	0.335	0.472	0.210	0.408
Professional position						
Manager or director	0.102	0.302	0.104	0.306	0.101	0.302
White collar worker	0.416	0.493	0.363	0.481	0.421	0.494
Blue collar worker or apprentice	0.483	0.500	0.532	0.499	0.477	0.499
Exposure to dangers such as dust, etc.	0.163	0.370	0.331	0.471	0.145	0.352
Noisy workplace	0.154	0.361	0.325	0.468	0.136	0.343
Bad posture induced by work	0.201	0.401	0.475	0.499	0.172	0.377
Feeling exposed to risk of injury	0.220	0.414	0.461	0.499	0.194	0.395
Excessive workload	0.141	0.348	0.351	0.477	0.118	0.323
Feeling exposed to bullying or discrimination	0.050	0.218	0.180	0.385	0.036	0.187
Feeling exposed to threats or physical violence	0.015	0.123	0.052	0.223	0.011	0.107
Firm characteristics						
Establishment size	0.724	0.447	0.791	0.406	0.717	0.451
Sector						
Agriculture	0.029	0.168	0.028	0.165	0.029	0.168
Industry excluding constructions	0.241	0.428	0.238	0.426	0.241	0.428
Constructions	0.073	0.260	0.083	0.276	0.072	0.258
Retail	0.115	0.319	0.079	0.271	0.118	0.323
Other activities	0.542	0.498	0.572	0.495	0.539	0.498
Personal characteristics						
Current job tenure	138.575	123.381	160.833	125.956	136.244	122.877
Square of current job tenure	34425.500	48902.350	41728.340	51012.770	33660.770	48613.290
First job	0.303	0.460	0.252	0.434	0.309	0.462
Looking for another job	0.053	0.224	0.097	0.297	0.048	0.215
Number of household members	3.187	1.101	3.140	1.113	3.192	1.100
Male	0.564	0.496	0.589	0.492	0.561	0.496
Born in Italy	0.929	0.258	0.921	0.269	0.929	0.256
Years of education	11.803	3.451	11.550	3.504	11.829	3.444
Square of years of education	151.218	86.489	145.670	87.484	151.799	86.364
Educational activities in last four weeks	0.052	0.222	0.087	0.281	0.049	0.215
Accident occurred on the way to work	0.011	0.104	0.026	0.158	0.009	0.096
Age class	4.128	1.107	4.380	1.034	4.101	1.112
Square of age class	18.264	9.116	20.251	8.802	18.056	9.124
Geographic area						
North West	0.279	0.448	0.244	0.429	0.283	0.450
North East	0.231	0.422	0.259	0.438	0.228	0.420
Centre	0.161	0.367	0.175	0.380	0.160	0.366
South	0.227	0.419	0.234	0.423	0.226	0.418
Islands	0.102	0.303	0.090	0.286	0.103	0.304
Occupation						
Executive or intellectual occupation	0.113	0.316	0.102	0.303	0.114	0.317
Technical position	0.240	0.427	0.226	0.419	0.241	0.428
Office clerk and qualified occupation	0.273	0.446	0.237	0.425	0.277	0.447
Craftsman and operator of industrial machinery	0.375	0.484	0.434	0.496	0.368	0.482
Civil status						
Unmarried	0.320	0.467	0.237	0.425	0.329	0.470
Married	0.603	0.489	0.662	0.473	0.597	0.490
Separated or divorced	0.060	0.238	0.083	0.276	0.058	0.233
Widow/widower	0.016	0.127	0.019	0.136	0.016	0.126