

This Final Report provides a review of the research carried out by the HEALTHatWORK team on issues related to theory and empirical evidence of the market for occupational safety and health (OSH). The increasing competition prompted by globalisation, the predominance of service-oriented industries, the rising job insecurity associated with labour market flexibility and demographic developments in the composition of the workforce (e.g. ageing, feminization), pose important challenges for the health and safety of workers in modern economies. In addition, many governments have recently paid greater attention to the need to tackle the non-trivial costs to both individual and societal welfare that the lack of OSH entails, as part of their overall strive to overhaul insolvent social security regimes.

(i) *Research on reviewing the state of knowledge*

**K Pouliakas and I Theodossiou (2011)** survey the state of affairs in the OSH literature and engage in an interdisciplinary survey of the current state of knowledge related to the theory, determinants and consequences of occupational safety and health (OSH). It first describes the fundamental theoretical construct of compensating wage differentials, which is used by economists to understand the optimal provision of OSH in a perfectly competitive labour market. The plethora of incentives faced by workers and firms in job and insurance markets that determine the ultimate level of OSH are discussed in detail. The extensive empirical evidence from the hedonic wage and stated choice approaches used to assess the value of OSH is reviewed. The causes of inefficiency and inequity in the market for OSH, such as externalities, moral hazard in compensation insurance, systematic biases in individual risk perception/well-being and labour market segregation are subsequently examined. The implications of government intervention and regulation for tackling the aforementioned inefficiencies in OSH are then considered. Finally, the survey identifies areas of future research interests and suggests indicators and priorities for policy initiatives that can improve the health and safety of workers in modern job markets.

**Barnay, Sauze and Sultan-Taïeb, (2010)** investigated the links between health and work - a major policy issue, in terms of retirement, public health, and employment. The review focuses on two different types of studies. Economic analyses have focused on measuring (1) the impact of health on employment and (2) the effect of working conditions on health. Poor health clearly appears to impede professional activity and may cause earlier retirement. Studies have to deal with two difficulties, the measure of individuals' health status and the implementation of longitudinal data collection. The associations between working conditions and health have been established by epidemiological studies for a large number of diseases. Economic studies also provide econometric estimations of the relationship between working conditions, health and absenteeism (Rubin model). In addition to public health measures designed to improve the overall health of the population, these studies raise questions about the specific role of work environment in preserving employees' health. Moreover, in a context of under-reporting and under-recognition of occupational illnesses and injuries, estimations of the costs imputable to occupational exposures require specific economic evaluations. Overcoming these obstacles remains a challenge for economic analyses.

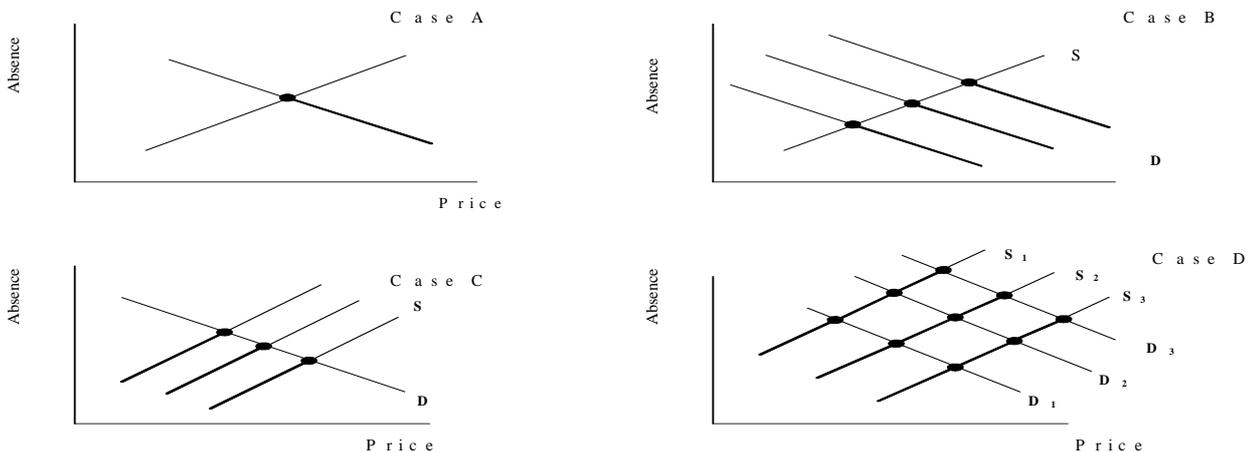
**Kopnina and Haafkens (2009)** discussed the differences in implementation of policies in relation to chronically ill employees in the context of organizational culture. This is a literature study using systematic hand-search strategy involving medical, statistical, management and social science databases (Web of Science, MedLine, Pub Med, Psych Info, etc.). For the purpose of this study include physical and not psychological or mental disorders. It appears that an appropriate organizational culture is required to be able to take measures to retain chronically ill employees. Various stakeholders view organizational culture as a magic bullet to help introduce company policy to retain chronically ill workers. Within functionalist approach to organizational culture, the three perspectives (integration, fragmentation and differentiation) can be distinguished. According to these perspectives, organizations are classified in accordance to the decision-making and hierarchical structures. The three organizational culture perspectives can be used for understanding what may constitute 'best practice' or 'best strategy' in to address the question of what the organizations can do to facilitate sustained employability for chronically ill workers. The main objective was to determine what type of organizational culture is more effective for policies and practices in case of optimal functioning of chronically ill employees.

**Serrier, Sultan-Taïeb, Sauze, Béjean (2009)** consider that studies have estimated the scope of under-reporting and under-recognition of occupational diseases and injuries in France. Non availability of data is a major obstacle to the evaluation of the costs imputable to occupational exposures. Moreover, it is often difficult to measure the effect of occupational and safety health interventions. Available studies have difficulties in measuring the fractions of diseases that could be avoided by prevention interventions. The occupational and safety health field has very different characteristics from the clinical health field, as regards randomized controlled trial, blind clinical testing. Job insecurity, workers turnover and temporary work contracts impede the follow-up of workers' health and working conditions. Therefore, a broader use of cost-benefit methods in the occupational and safety health field would require a wider access to data and a more systematic measure of interventions costs and effects.

**Drakopoulos, Economou, Grimani, (2012)** present a detailed review of current state of legislation framework and empirical research regarding OSH issues in Greece and point out the knowledge gaps & methodological shortcomings. The Greek legislative framework regarding OSH issues has been greatly updated and advanced in the past two decades following the relevant EU legislation. Several shortcomings in the Greek labor market hamper the efforts to achieve efficient OSH measures. Such shortcomings are the lack of trained personnel (physicians etc.) at workplaces; the lack of occupational health inspectors to monitor the enforcement of the law; and the lack of education and information among employees and employers regarding occupational health. Greece exhibits one of the lowest spending on social public policies compared to the EU average and the national social policy is often criticized for the lack of preventive measures and treatment of occupational accidents and diseases once they occur (Christopoulou and Makropoulos, 2007). Only a few studies utilised large samples of workers for a larger time span, to examine the frequency and the determinants of working accidents while the remaining studies provide findings based on small-scale personal interview surveys (Alamanos et al., 1986; Alexe et al., 2003). According to the IKA reports (1999-2006), men sustain the greatest number of fatal and no fatal accidents at work. Most accidents occur in the construction sector and involve upper and lower extremities. During the 1997-2006 decade, there was an annual drop in the number of accidents, at a 4.8% mean rate of reduction. In addition, most prevalent causes of fatal accidents are collision with immobile objects & falling from a height. Most fatal accidents occur in the construction sector and involve cranio-cerebral injury. There is a substantial lack of data on occupational diseases. For the period 2003-2007, when the recording of occupational diseases begun to be implemented in Greece, 103 cases were found. The basic diagnoses are allergic contact dermatitis, toxic effect of metals and asthma. Chemical and industrial agents are described for most cases as casual agents of exposure to disease. According to a cross-sectional study in 2007 of ESYE at recording mental health problems due to work, males are found to be slightly more sensitive to the negative working conditions than females. The main indicators related to OSH that can be drawn from the Social Insurance Institute, Body of Work Inspection, National Statistical Service of Greece are occupational and fatal occupational accidents, occupational diseases, mental health and absenteeism.

*(ii) Research on Sickness Absence*

Can one explain the individual behaviour regarding absenteeism from work by utilising the concept of a ‘market for absenteeism’? **Barmby (2012)** argues that it is certainly what workers’ will demand for various reasons, sickness being one such reason. It is also something which though various, either firm specific arrangements or governmental regulations, firms and governments will facilitate (or supply) to workers. This research is motivated by a recent book on the issue (**Treble and Barmby (2011)**). The problem is identified by E. J. Working (1927) who gives a framework within which to think about observed market data. How are the various cases depicted below informative?



- *Case A – Little can be said, we observe one equilibrium point, which isn't going to tell us much about either the demand or supply schedule*
- *Case B and C – are the most promising, here we have either shifts in the supply curve (C) which allows us to see the demand curve or shifts in the demand curve (B) which allows us to see the supply curve*
- *Case D – Here we have shifts in both supply and demand curves at the same time so the data we observe doesn't tell us much about either.*

Is it more useful to know something about the supply curve or the demand curve? The supply curve is essentially decided by either firms or governments. Demand reflects worker's preferences, and will give some basis for predicting the effect of policy. In Barmby, Orme and Treble (1991) the effects of a particular experience-rated sick pay scheme was studied. These schemes may be problematic since absence behaviour itself determines the “price” one end up

paying, (or at which absence is supplied to him/her). So high absence in one year will make the cost of absence higher in subsequent years – in the diagram below you move from  $S_A$  to  $S_C$  for instance. One idea which might be worth exploring is the extent which health data might help. The idea is if data on, say, flu, incidence, *in previous years* (remember the way experience rated schemes work), could be found, then one may have an instrument for “price” of absence which is uncorrelated with present absence behaviour. However detailed localised data on flu incidence is difficult to be found. So the research uses Pneumonia which is measured more consistently across geographical areas in the UK and which will have a correlation with flu. Pneumonia can develop (mainly in old people) from flu. Using data from two factories (in England and in Scotland), variation in death from pneumonia per 100,000 of population is an instrument for “price” of absence. Higher pneumonia deaths will be correlated with higher incidence of flu, and higher incidence of flu will cause higher cost of absence in the following year. The results are suggestive that this may be a useful empirical strategy. One problem is that the health data cannot be measured at a sufficiently defined geographical locality. The factories are in 2 large cities in Scotland and England but the health data refer to either the whole of England and Wales or Scotland. The Table below shows the regression for full time male employees from three factories (N=715) in 1988 in UK. The dependent variable is the mean absence over the year. The empirical results support the accompanying figure. Estimating not taking account of the fact the data is generated in a market context can underestimate the effect of cost.

	Cost not instrumented		Cost instrumented with Health data	
	Coeff	t statistic	Coeff	T statistic
Constant	0.0309	7.83	0.0309	7.27
Grade B	0.0104	1.46	0.0137	1.96
Grade C	0.0186	0.88	0.0527	2.52
Cost	-0.0009	0.95	-0.0027	2.29

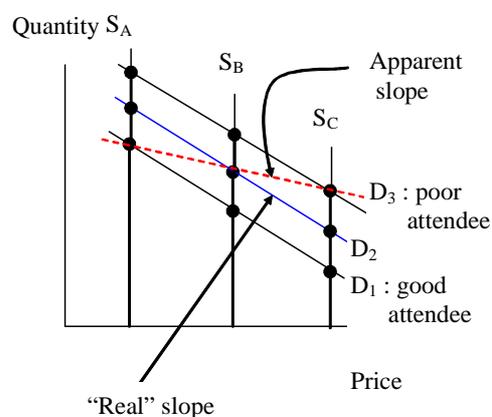


Table 1: Source: Treble and Barmby (2011)

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**Ercolani (2012)** considers the proportion of UK work hours lost due to sickness absence calculated for all employees across time and across various economic and demographic characteristics, using the UK Labour Force Surveys (LFS). The total sample is over four million cases spanning 1984 to 2008. Quantifying sickness absence is of interest to practitioners and researchers because it represents lost work hours for employees and employers. It highlights issues relating to the health of the workforce. The techniques presented show how these rates of sickness absence can be calculated for most countries that administer a LFS. The paper also shows now confidence bands around these average rates can be computed. It also shows the special statistical techniques that are needed to calculate the confidence bands for these absence rates because we are calculating the mean value of ratios. The absence rate is defined as the ratio of hours reported absent due to sickness (excluding overtime) to work hours (excluding overtime). More precisely, for all

workers  $i$  in category  $j$  the estimated ratio  $R_j$  of sickness absence to work hours for the population is defined by equation (1), the proportion of work hours lost due to sickness absence in the employee workforce:

$$R_j = \frac{\sum_{i=1}^n A_{ij}}{\sum_{i=1}^n H_{ij}} \quad (1)$$

where  $j$  can index any category, or categories, of interest; such as year and/or gender.  $A_i$  is the number of hours absent due to illness for worker  $i$  during the reference week.  $H_i$  is the number of work hours for worker  $i$  during the same reference week.  $i$  indexes the individual respondent. Although the absent hours and work hours ( $A_{ij}, H_{ij}$ ) are based on the survey week, the proportion of absent hours for any given time interval, such as month, quarter or year, can still be generated and no bias is induced by the aggregation. Equation (1) can obviously be reformulated as a ratio of means if we divide both the numerator and the denominator by the number of observations  $n$ . Based on either Cochran (1977, section 2.11) or Kendall et al. (1994, section 10.6), equation (1) can be used as a basis for calculating the standard error for the ratio of two means:

$$\text{s.e. } R_j = \sqrt{\frac{\text{Var}(\bar{A}_j) + R_j^2 \text{Var}(\bar{H}_j) - 2R_j \text{Cov}(\bar{A}_j, \bar{H}_j)}{\bar{H}_j^2}} \quad (2)$$

where by the central limit theorem the variances and covariance of the means are given by  $\text{Var}(\bar{A}_j) = \text{Var}(A_j) / n$ ,  $\text{Var}(\bar{H}_j) = \text{Var}(H_j) / n$  and  $\text{Cov}(\bar{A}_j, \bar{H}_j) = \text{Cov}(A_j, H_j) / n$ . calculations of the rate of sickness absence across each year from 1984 to 2008 suggest that approximately 3% of usual working hours are lost to sickness absence each year. Though this annual rate is relatively constant, the same calculations by quarter and month show that there is a very high degree of seasonal variation with peaks at 4.5% and troughs at 2.8%. The seasonal variation in the absence rate is illustrated in Figure 1 below. Calculations for the annual rates of sickness absence by gender show that females have a systematically higher absence rate than males and annual rates of sickness absence by public/private sector splits show that public sector employees have systematically higher absence rates. These patterns may be driven by additional factors such as differing levels of responsibility in household production and the prevailing personal labour market circumstances. Calculations of the rate of sickness absence across economic and demographic characteristics highlight additional features of interest. Rates of sickness absence seem to increase with age but are remarkably low for employees who work beyond retirement age. This is illustrated in Figure 2.

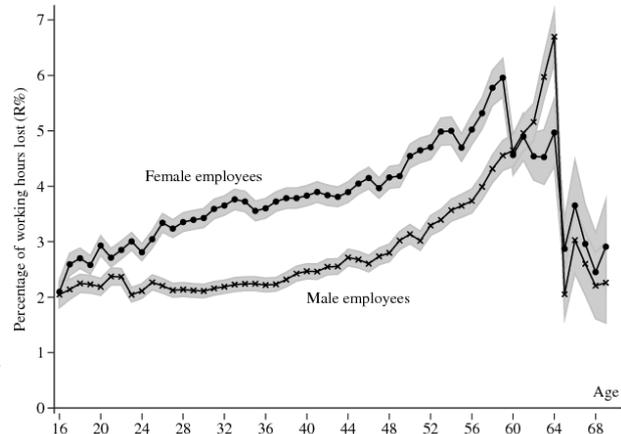
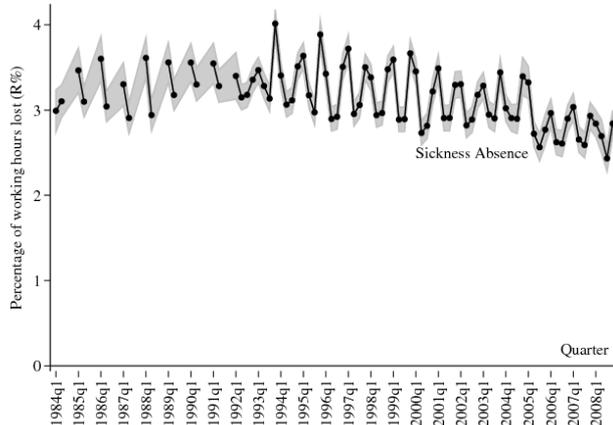


Figure 1 UK sickness absence rate  $R$  by year and quarter

Figure 2 UK sickness absence rate  $R$  by gender and age

The rates of sickness absence with respect to children being present in the household seem to be very different between females and males and suggest that young children have a substantial detrimental effect on females' sickness absence rates. Rates of sickness absence seem to rise and fall with the number of usual working hours with the peak being at around 30 usual working hours per week. Rates of sickness absence also vary dramatically with the industry in which employees are working as illustrated in Figure 3.

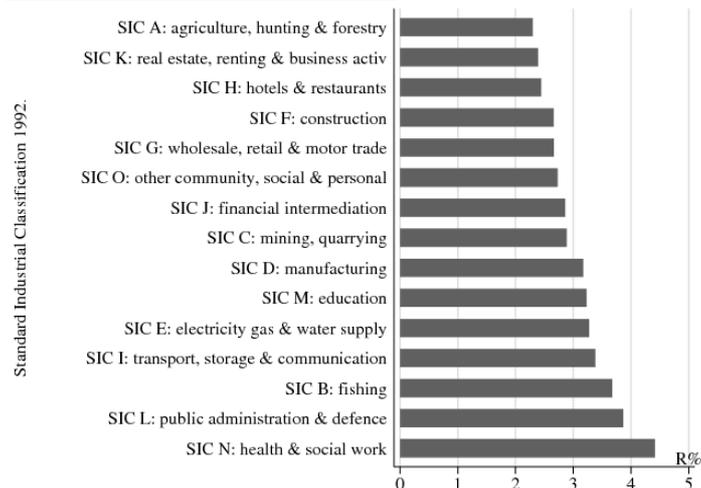


Figure3: UK sickness absence rate R by industry

Industries dominated by the public sector tend to have higher absence rates and industries in the services sectors tend to have lower absence rates. For manual industries the picture is much more mixed. In some industries the number of observations per industry is relatively small (SIC A and B) and it is therefore difficult to give much weight to these results. In other manual industries (SIC C, D, E and F) the absence rates tend to be in the middle of the range. Though these are industries where injury and illness are more likely, those who are long-term ill or injured are unlikely to continue working in these industries and they are therefore not in the sample because no longer working there.

*Barmby and Ercolani (2012)* show that there exists a North-South divide in the UK regarding the rates of sickness absence. This is the first study to examine these differences using a systematic statistical analysis. Differences in employees' sickness absence rates are analysed as a function of a rich set of economic, social and demographic characteristics. A Blinder (1973) and Oaxaca (1973) decomposition is used. Differences in characteristics are captured by the mean values of the characteristics; differences in behaviour are captured by differences in parameters of estimated models for the two groups. The North-South divide in region-of-work is used to define the two groups of employees and their rates of sickness absence are analysed. The Table 2, based on UK LFS data 2006-2008, shows that the difference in absence rates between the north and south of the UK is 0.374 percent. This 0.374 percent (a 13.37 percent difference)<sup>1</sup> has two components. The first component is the explained one and is useful for policy-makers because it identifies how differences in employees' characteristics affect the outcomes. The second component is the unexplained one, sometimes referred to as discrimination. It is useful for policy-makers because it identifies how differences in outcomes are due to differences in the estimated parameters which reflect differences in behaviour, either by the individuals themselves or by others' attitudes toward those individuals.

	Mean Percent Absence	Observations
North:	2.975	75,269
South:	2.602	55,468
Raw difference (R)	0.374	

Note: North: Tyne and Wear, Rest of North East, Greater Manchester, Merseyside, Rest of North West, South Yorkshire, West Yorkshire, Rest of Yorkshire and Humberside, East Midlands, West Midlands and Metropolitan Area, Rest of West Midlands, Wales, Strathclyde, Rest of Scotland, Northern Ireland. South: East of England, Inner London, Outer London, South East, South West.

Table2: Difference in Mean Percentage Sickness Absence.

Two-fold and three-fold Blinder-Oaxaca decompositions are carried out and the summary findings are presented in the Table 3. The raw difference  $R=0.374^{***}$  is statistically significant. The explained/endowment component  $E=0.315^{***}$  is statistically significant and accounts for the majority of the raw difference. The other components ( $U, C, I$ ) are not significant statistically and are not significant in magnitude. Detailed analysis of various socio-economic sub-components of these decompositions characteristics reveal that the significant explained/endowment components are driven by being female, holding a second job, working in the public sector and, predominantly by the hourly wage rate. The findings suggest that differences in absence rates across regions are not caused by differences in estimated parameters. The differences in sickness absence rates are driven by differences in characteristics.

<sup>1</sup> Calculated by  $(2.975-2.602)/(0.5*(2.975+2.602))=0.1337$

<i>Decomposition</i>	<i>Twofold</i>	<i>Threefold</i>
North: Mean PercentAbs	2.975*** (49.3)	2.975*** (49.3)
South: Mean PercentAbs	2.602*** (40.3)	2.602*** (40.3)
<i>R</i> : raw difference	0.374*** (4.23)	0.374*** (4.23)
<i>E</i> : explained	0.315*** (10.7)	
<i>U</i> : unexplained	0.0581 (0.63)	
<i>E</i> : endowments		0.315*** (10.7)
<i>C</i> : coefficients		0.0284 (0.31)
<i>I</i> : interaction		0.0297 (0.72)
Observations	123,105	123,105

Table 3: Blinder-Oaxaca Decompositions of Percentage Sickness Absence

The characteristics in absence equations are either characteristics of employees (demographics) or of the jobs they occupy (wage incentives). It appears that demographics are not the main source of the absence differences. Half of the raw difference in sickness absence is due to regional differences in the wage.

**Beblo (2012)** investigates sickness absences of men and women from a longitudinal perspective. The paper derives and test hypotheses on determinants of the private and the job absences of male and female employees using the German Socio-Economic Panel (GSOEP), 1985 and 2001. The results of ordered probit estimations confirm that women's and men's sickness absences are related to both working and household conditions. Higher female absences due to family reasons do not seem to represent actual behaviour of German employees. Differences between genders are identified with respect to the relative importance of working conditions for absences and the relative importance of household structure versus amount of time spent in household production. Lack of autonomy has a larger impact on male absenteeism, whereas the work-related relationship with colleagues and supervisors is more important for female employees (Figure 4, where the marginal effects of autonomy on the probability to be absent from work for 1-7 days, 8-14 days and so on is always larger for men and the marginal effects of a supportive environment are larger for women). This finding is robust even conditional on occupation, although the autonomy-absence pattern is evidently related to the occupational segregation by gender. The results support the difference-in-vulnerability argument that women and men react differently to strains and benefits even when they hold the same job (measured by position and occupation) due to their different resources and coping strategies.

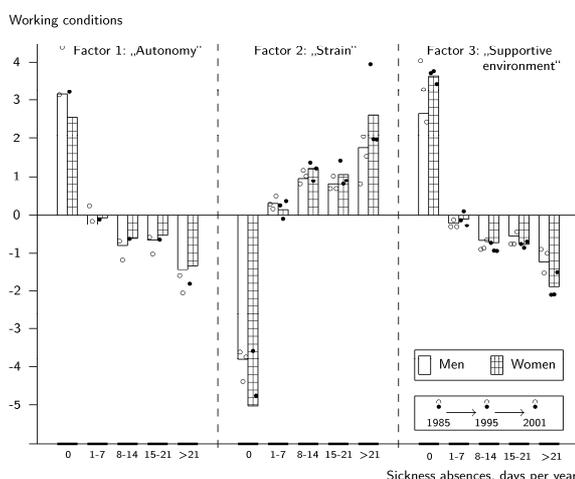


Figure 4: Marginal effects of working conditions

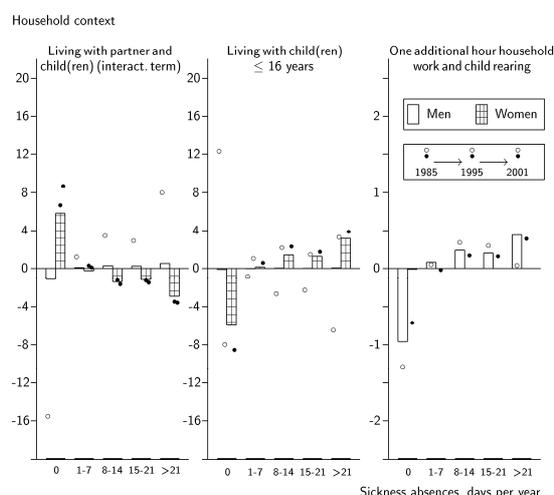
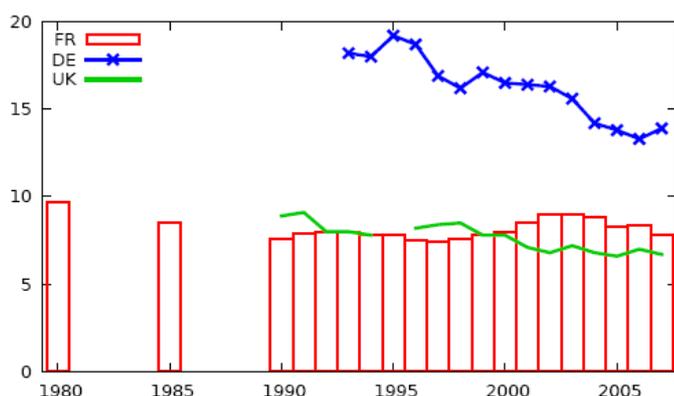


Figure 5: Marginal effects of the household context

Note: GSOEP, 1985, 1987, 1995 and 2001; own calculations. Pillars represent the marginal effects of the pooled regression and bullets indicate the marginal effects of the separate regressions for 1985 (N = 2,140/1,282 men/women), 1995 (2,773/2,133) and 2001 (3,890/3,159). Control variables include age, education, job position, working hours, tenure (and year dummies).

As for the role of the household, the amount of actual household work and child care is positively related only in the case of male absences, while female employees in general stay home more often when living with a child under the age of 16 (see Figure 5). Women living with children are less absent when they have a partner in the household. They also indicate the potential empirical relevance of the ‘double burden’ for both women and men. This finding is particularly interesting in light of the potential selectivity of the (female) sample, as those not included in the analysis are likely to experience an even larger ‘double burden’ if working.

**Schreiber, (2011)** propose a time-series based approach to test the existence of presenteeism as a phenomenon induced by high unemployment. Presenteeism means that workers show up at their workplace even though they are sick. The study uses official diagnosis-specific sick leave data for Germany. In order to measure any discrepancies between claimed sick leave and the true sickness incidence over time, the volume of internet searches for certain symptoms is used as a proxy for the actual sickness incidence in Germany. To this end the publicly available Google search data from “Google Insights” is used. The paper tests for the influence of labor market conditions on the propensity not to claim sick leave. The tested hypothesis was whether the level of the (non-stationary) unemployment rate has a longer-run influence on the discrepancy between claimed sick leave and actual sickness incidence, using standard tools from time-series econometrics such as cointegration analysis. Many of the relevant variables appear to be non-stationary in the short sample used. The cointegration tests find some evidence for longer-run relationships between the unemployment rate and the sickleave/sickness discrepancy for the sicknesses related to (a) the metabolism, and (b) the digestive apparatus. The sign of the relationship would contradict the unemployment-induced presenteeism hypothesis. For the remaining three sickness groups defined there is no evidence in favour of a relationship between unemployment and the sick leave/sickness discrepancies. The findings are not compatible with the presenteeism hypothesis. This could partly be explained by the very short samples available from Google Insights.



Missed workdays (per person per year) due to claimed and paid sickleave in European countries; memo item, annual data. Source OECD health data via GBE Bund.

Figure 6: Missed workdays in comparison

Another reason could be the historical sick leave trends in Germany that have been different from those of some other countries (see Figure 6 for a comparison with France and UK). The finding of an existing relationship carries over to the aggregate series which is calculated as the sum of the variables for the five sickness groups that we consider. The unexpected sign is also sustained. In all of these potential long-run relationships, it appears that the unemployment rate is long-run exogenous, i.e. the adjustment to the longer-run relationship is ensured only by the sick leave/sickness discrepancy variables. This causality direction seems plausible.

**Drakopoulos and Grimani, (2011)** argue that most of the literature on absenteeism suggests that absence from work is a complex issue influenced by multiple causes, both of personal and of organizational nature. There is ample literature focusing on the relationship between job satisfaction and absenteeism (Steers & Rhodes, 1978; Scott & Taylor, 1985; Brooke & Price 1989; Hoque & Islam, 2003; Bockerman & Ilmakunnas, 2008). However, there is a lack of attention to the injury related absenteeism and its relationship with job satisfaction. The data used in this paper was drawn from the EU Commission funded project, SOCIOLD (<http://www.abdn.ac.uk/sociold/index.htm>). By using the Tobit model, the results indicated a statistically significant inverse relationship between the number of days employees stay absent due to occupational injury, and their job satisfaction levels indicating that a specific type of absenteeism is associated with job satisfaction. Although prior research suggested that all of the predictors should relate to absenteeism, only three exhibited significant relationship in this paper. No significant relationship between age and injury absenteeism has been found. There is a significant relation between injury absenteeism and gender (males). Although there is no effect of type of employment and education on absenteeism, permanent workers exhibit less

absenteeism rates, while individuals with middle education are more prone to absenteeism. There is no effect of career neither of type of industry on absenteeism. The results of the present paper indicate that a specific type of absenteeism might offer more empirical information to the complex absenteeism – job satisfaction relationship.

**Blazquez, (2012)**, highlights the trends of absenteeism among Spanish employees using the Spanish LFS micro-data. Absenteeism is an important part of the individual decision on actual working hours. It might be an efficient individual response in the presence of institutional constraints - such as minimum working hours - that affect individuals' choice between work and leisure (Dunn and Youngblood, 1986). However, significant efficiency costs may arise when absence costs are not internalized by workers. This moral hazard problem leads to lower values of output and employment in equilibrium, owing to the imperfect substitutability of absent workers. If insurance costs are mainly borne by the government, as is the case in most European countries, significant fiscal costs will also arise. Employers are aware of the direct and indirect costs of sickness absence. The direct costs include statutory sick pay, cost of replacement staff and loss of output. The indirect costs, difficult to quantify, are also related to sickness absence. These include low morale among staff who have to carry out the extra work for those who are absent, the cost of managing absence and the impact on training and development, all of which impact on the overall levels of output of the organization. Using data from the Spanish LFS (1996-2004) provides evidence for the proportion of contracted work hours lost due to sickness absence, its evolution across time and its main determinants. The estimation results reveal that females are significantly more likely to be absent from work due to sickness than males. Although there are no formalized theories that explain gender differences in sickness absence rates, empirical findings suggest that such differences exist. One way to understand it is to relate the disparity between men and women in sickness absence to the way they cope with adverse working conditions: men and women are on average different in how vulnerable they are to adverse working conditions (Koheler et al., 2006; Väänänen et al., 2003; Mastekaasa, 2000; Messing, 1998). Gender differences can also be explained by a combination of biological, psychological and socio-cultural factors. For instance, if women must conciliate family and work activities they are more likely to have a higher level of 'life stress' and thus to be more vulnerable to work-related stress. The presence of children in the household does not seem to increase the likelihood of absenteeism neither for males nor females. However, the effect of marital status significantly differs between males and females. Taking singles as the reference category, married females present a higher probability of being absent from work, while the opposite is observed among the male subsample. Sickness absence is found to be positively related with age. This relationship between age and sickness absence – especially long-term absence – can be partly explained by the positive correlation between age and prevalence of chronic diseases. Furthermore the results reveal that higher educational attainments are associated with lower rates of absenteeism due to sickness. The estimation results reveal that increased job insecurity, captured by temporary contracts, has a negative effect on absenteeism. Public sector employees are more likely to be on sick leave than those in the private sector. There may be several reasons behind these differences in absenteeism. One is that private employers have stronger incentives to prevent absence, since it is costly to the employer, whereas public employers have weaker direct incentives to minimize costs to their organization. Another explanation is based on the possibility of self-selection: workers with preferences for frequent absence self-select the public sector because of its higher degree of employment security. The results also reveal remarkable differences in sickness absence rates between occupational groups. In line with the existing evidence, blue collar workers exhibit a higher sickness absence rate than white collar workers (Taylor, 1979; Steers and Rhodes, 1984). This result can be partly attributable to the greater likelihood of injury at work among manual jobs.

*(iii) Research on exposure to job strain and psychological or physical health*

**Sultan-Taïeb, Sauze, Vieillard, Sultan, Niedhammer, (2011)** explore the validity of a measure of job strain, defined by the combination of high psychological demands and low decision latitude, in order to compare job strain exposure. They examine the role of welfare state regime in the differences in this exposure between countries using a random sample of 9,953 male and 11,462 female employees in 27 European countries from the European Working Conditions Survey (EWCS) in 2005. Two measures of job strain (12- and 19-item) were constructed. Multilevel logistic regression analyses were performed controlling for covariates: gender, age, occupation, economic activity, public/private sector, part/full time work, and number of workers in household. Both measures of job strain had satisfactory psychometric properties: internal consistency, correlations, and factorial validity. The lowest prevalence of exposure was observed in Sweden and the highest in Greece. Significant differences in job strain exposure were observed between countries even after controlling for covariates. Working in a Southern, Eastern European or Bismarkian welfare state regime was associated with a higher risk of exposure for men. Welfare state regime contributed to explain the differences in job strain exposure between countries especially for men. This comparative analysis of job strain exposures may assist decision-makers in orienting prevention policies in order to improve working conditions at European level.

Sauze, Sultan-Taïeb, Viellard, (2010) use two waves of the (EWCS) (2000 and 2005) to study the evolution of exposure to psychosocial risks in six countries (Germany, Spain, France, Italy, United Kingdom, Sweden). Differences in exposure between countries tended to increase during the period. Swedish workers had the lowest (or one of the lowest) exposure to psychosocial risks, except for psychological demands (Figure 7). They have experienced the largest decrease in exposure during the period. These differences can be explained by the form of work organization (Lorenz and Valeyre, 2005). The legal context can be also a factor of explanation; the work environment act compels a systematic work environment management including psychosocial risks.

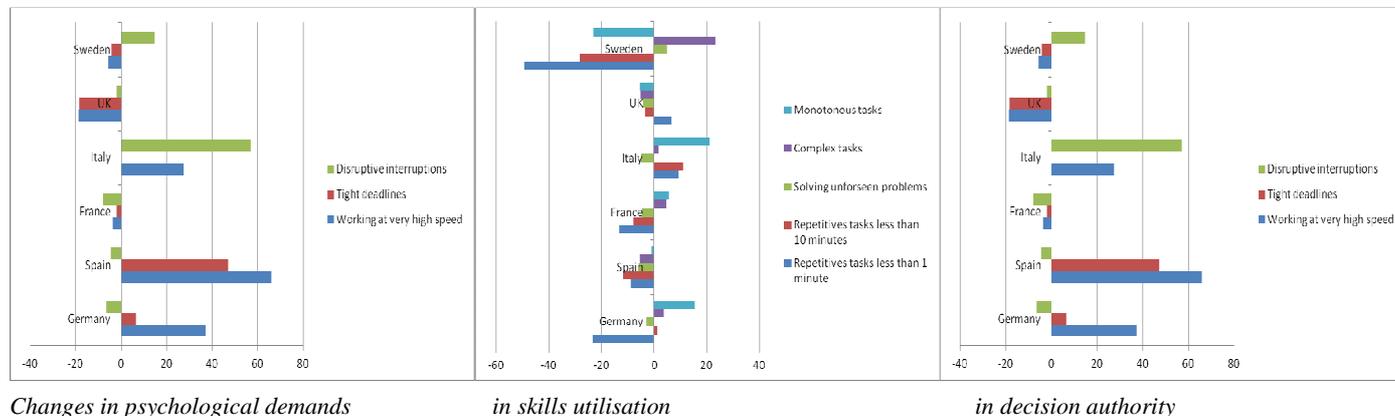


Figure 7 Changes in psychological demands

Jones, Latreille and Sloane (2011) use matched employee-employer data from the British Workplace Employment Relations Survey (WERS) 2004 to examine the determinants of employee job anxiety and work-related psychological illness. Organisations have been keen to highlight the business case for improving employee psychological health, and highlight sickness absence, employee turnover and presenteeism (being at work, but working at less than full capacity) as mechanisms through which psychological health may influence firm performance (see, for example, Sainsbury Centre for Mental Health, 2007). The methodology underlying this evidence relies on estimating work time 'lost' as a result of psychological ill-health using responses from employees and converting this into an aggregate economic or monetary cost by multiplying it by an estimate of the value of work, often measured using hourly wage rates (Stewart *et al.*, 2003 and Goetzel *et al.*, 2004). These studies, do not distinguish between the costs of psychological ill-health and work-related psychological ill-health, the latter of which may be within an employer's more direct control. This paper extends the analysis of Leontaridi and Ward (2002). It contributes to the literature by first using a large scale nationally representative data of workplaces in both the public and private sector and it provides a comprehensive analysis of the determinants and effects of employee psychological health. Second, by focusing on work-related psychological health, it examines an aspect of psychological health over which employers have more control and to which modifications of work practices may have more influence. Third, the data contain an extensive set of controls for the influence of job characteristics and the workplace on psychological health, including measures of co-worker psychological health. Fourth, the matched nature of the data facilitates the examination of the relationship between psychological health reported by employees and workforce psychological health and workplace performance reported by the manager. Measures of absence, quits and labour productivity are utilised in an attempt to identify the channels through which work-related psychological health may influence workplace performance. The paper provides evidence on personal and employment related characteristics that are correlated with employee job anxiety. Overall, the results are largely consistent with the existing literature which finds that psychological ill-health is more strongly related to factors relating to the job than worker characteristics (see Groot and Maassen van den Brink, 1999 and Michie and Williams, 2003). There is strong support that job anxiety is positively associated with job demands, consistent with Wood (2008). Average levels of job anxiety have a positive influence on managers reporting workforce stress, suggesting that employee reports contain valuable information. A one unit change in the job anxiety index is associated with a 12 percentage point increase in the probability of manager-reported workplace stress. There is also evidence of a positive relationship between job anxiety and absence with a one unit increase in average workplace level of employee job anxiety being associated with a 2.90 percentage point increase in the absence rate. No relationship between job anxiety and the workplace quit rate is found. There is some evidence from the subjective and objective measures of labour productivity to suggest a negative association between work-related psychological ill-health and workplace labour productivity. The paper considers the possible endogeneity of job anxiety in the analysis.

Haafkens, Kopnina, Meerman, van Dijk, (2011) suggest that chronic diseases are a leading contributor to work disability and job loss in Europe. The aim of this qualitative study was to explore and compare the perspectives of Dutch LMs and HRM on what is needed to facilitate job retention for chronically ill employees. To achieve this aim

we held two focus-group sessions, using the concept-mapping methodology. During the first part of the session participants were asked to generate statements to complete the following focus prompt: *In order to ensure that chronically ill employees can continue to work, it is necessary that ...?* During the next part of the session participants were asked to rate the importance of the statements on a five point scale and to sort them according to theme. The results from the two concept mapping meetings were analyzed separately for HRM and LMs. The means of the importance ratings the participants assigned to each statement were calculated at a group level. This resulted in a rated list of statements for HRM and LMs. Using a series of statistical analyses (multi-dimensional scaling techniques and then hierarchical cluster analysis, the participants' statements and sorting results were aggregated at a group level. The brainstorm session yielded 35 statements expressing the thoughts of the participants on what is necessary in order to ensure that chronically ill employees can continue to work. Analysis of the sorting activity revealed that each group sorted the statements into a set of six distinct thematic clusters, referring to conditions they perceived as necessary to ensure that chronically ill employees can continue to work. Figures 8, 9 show the cluster maps.

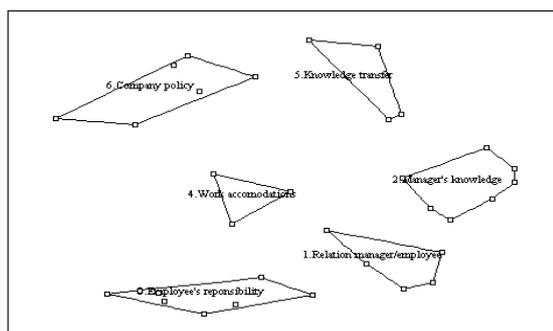


Figure 8: Perspectives of line managers on what is needed to ensure continued employment for chronically ill employees: cluster map.

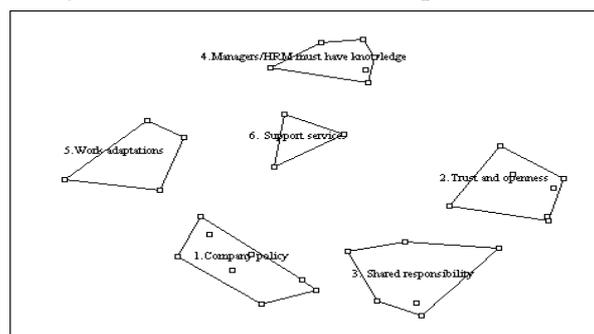


Figure 9: Perspectives of human resource managers on what is needed to ensure continued employment for chronically ill employees: cluster map

*Line Managers* regarded “good cooperation between manager and employee” as the most important condition to ensure continued employability for chronically ill employees (Cluster 1). The statements grouped under this theme indicate that this involves mutual trust, contact, shared responsibilities between manager and employee, and attentiveness from the manager, but also the ability of the employer to make demands on the employee. Cluster 2 indicates that LMs also find it important that “a manager must have basic knowledge of how chronic illness can affect work”. A relatively high priority was also assigned to the “role of employees themselves” (Cluster 3). Almost just as important is the theme that “work should be accommodated to the condition and needs of the employee”, within the capabilities of the organization (Cluster 4). Cluster 5 indicates that “good information and knowledge transfer between managers, occupational physicians and HRM “is also perceived as a prerequisite for facilitating the employability of chronically ill workers. Cluster 6 concerns the need to develop a “company policy” with respect to chronically ill employees. Although this theme has the lowest average score (3.1), a relatively high score was assigned to the statement “an organization should reflect on what it means to be a good employer for the chronically ill employee.” Other statements grouped under this theme refer mostly to organizational policies and practices that need to be in place according to the LMs. *HRM* assigned the highest importance to “company policy” as a condition to facilitate sustained employability for chronically ill employees (Cluster 1). The statements they grouped under this theme refer to what the employer, the manager, the organization and the employees must do in order to develop such a policy: the *employer* must realize that the employee cannot continue to work in an unhealthy situation; the work must be suited to the condition of the employee; *managers* must have the right to make demands on employees and evaluate the consequences of an employee’s illness for his or her colleagues; the *organization* needs to reflect on what good employership involves; and the *employees* must understand their capabilities and limitations. A second, almost equally important cluster is that there must be “a culture of trust, openness and communication” within the organization. This theme contains statements regarding the relationship between managers and employees. The third cluster indicates that *HRM* also feel that chronically ill employees and managers must “share responsibilities” in order to ensure continued employability for the employee. From the part of the LMs this means removing the employee’s fear of repercussions or shame about his or her condition, while the employee must realize that privacy is not always possible. The fourth cluster contains statements indicating that both “managers and personnel officers” should have sufficient “knowledge about chronic illness and its impact on work” to be able to act proactively. The fifth cluster indicates that “work adaptations” are also seen a condition to help ensure job retention for chronically ill employees, and the statements in this cluster refer to who should be responsible for providing these accommodations. Cluster 6, “support services within the company”, was given the lowest average priority. It contains some low-rated statements suggesting possibilities for centralized services for chronically ill employees within the organization. Both similarities and

differences were found between the views of LMs and HRM on what may facilitate job retention for chronically ill employees. Mutual trust between the manager and the employee was rated as the most important statement by both groups. Four thematic clusters were mentioned by both groups; two uniquely by LMs; and two uniquely by HRM. LMs saw “good employee/manager cooperation” as the most important starting point for enabling job retention. For HRM the most important starting point was “corporate policy and culture”.

**Serrier, (2011)** evaluates the social cost of respiratory cancer attributable to occupational risk factors in France and reviews the available epidemiological data in the literature. By using the Medline database, a review of the literature restricted to meta-analysis highlights the relative risk data available. The method of Attributable Risks (AR) is mobilized to estimate the numbers of lung, sinonasal and mesothelioma cancer cases caused by asbestos, exhaust fumes from diesel engines, painters, crystalline silica, wood dust and leather dust. The author then assesses the costs of these cancer cases for the French society using the Cost of Illness (COI) method. To take into account all indirect costs a decision tree is developed to estimate the probability of being involved in each cost category. Cancer-specific assessment models for each category of costs are set up to allow the estimation, according to incidence-based and prevalence-based approaches, direct costs (hospital and ambulatory care), indirect costs of morbidity (absenteeism and presenteeism) and mortality in the market and nonmarket spheres. The study estimates that exposure to asbestos in the workplace is responsible for 5 618 lung cancer cases and 3 676 deaths in 2010. The number of lung cancer cases attributable to exposure to exhaust fumes from diesel engines is estimated between 2 367 and 3 283 for 2010 and the number of deaths between 1548 and 2146. Occupational exposure to crystalline silica would be responsible for 1209 to 2 241 lung cancer cases and between 790 and 1 475 deaths. For 2010, the social cost of lung, sinonasal and mesothelioma cancer cases caused by asbestos, exhaust fumes from diesel engines, painters, crystalline silica, dust wood and leather dust in France is estimated between 986 and 1248 million euros according to prevalence-based approach and between 1223 and 1586 million euros according to incidence-based approach among which 760 to 806 million euros only for asbestos.

*(iv) Research on working conditions and health at work*

**Böckerman, Petri, Johansson and Kauhanen, (2011)** argue that there is scarce literature on the effects of innovative work practices on employees. Contradicting results dominate the empirical literature focusing on the impact of innovative work practices on employee health. One reason for this unsatisfactory situation might be that the existing studies typically investigate cumulative disorders and other specific injuries or illnesses. Accordingly they overlook possible concomitant effects on other illnesses and the general well-being of employees. This paper provides a more comprehensive picture of the effects of innovative work practices on employee health by studying their impact on sickness absence and accidents at work. The analysis is based on the Finnish Quality of Work Life Survey for 2008. The Finnish case has a broader interest for several reasons. While innovative work practices have rapidly gained popularity in Finland, the country is also characterised by a conspicuously high share of sickness absenteeism. The high unionization rate in combination with close co-operation between employees and employers should provide an exceptionally fertile ground for the benefits of innovative work systems to emerge and, hence, for minimizing the potentially negative effects of such practices on employee outcomes. The impact of workplace innovations on employee health in terms of sickness absence and accidents at work is assessed by estimating the joint effects of innovative work practices (self-managed teams, information sharing, employer-provided training and incentive pay) since workplace innovations are known to be complementary in their effects rather than substitutes. However, the effects can be expected to differ significantly between employee groups as well as absence measures (any absence, long-term absence, accidents at work). Thus a distinction is made in the analysis in these respects. The results provide no clear-cut support for workplace innovations causing an increase in long-term sickness absence or in the prevalence of accidents at work. Also the effects of these systems on short-term sickness absence are found to be close to negligible. The overall conclusion of the paper, therefore, is that high-performance workplace systems have little impact on the overall health of employees in Finland.

**Keith A. Bender K and I. Theodossiou (2012)** point out that an interesting and little explored potential unintended consequence of performance pay is its effect on health. Except for a limited number of studies this observation has not been empirically tested, and the small literature that has examined this topic has focused very narrowly on injuries at work. Previous research shows that performance related pay generates increased effort and productivity at work. However, it may also generate a series of unintended consequences. Adam Smith was the first to observe in *The Wealth of Nations*, “*Workmen ... when they are liberally paid by the piece, are very apt to overwork themselves and to ruin their health and constitution in a few years*”. The goal of this paper is to use a nationally representative dataset to broaden the definition of health to examine other health outcomes, particularly ones affected by stress, to see if Smith’s observation holds, particularly with respect to the implication that increases in the length of time paid using piece rates will negatively impact ‘health and constitution in a few years’. Using multiple waves of the British

Household Panel Survey dataset, duration models find that increasing the time in which workers' pay comprises at least in part of performance pay generates higher odds of falling into bad health – either measured by subjective health or along one of three physical health dimensions (Table 4).

Sample	Cox	Prentice-Gloeckler	
		w/o Frailty	w/ Frailty
Overall	1.004***	1.005***	1.013***
Overall with Past health controlled	1.003***	1.004***	1.009**
Female	1.004**	1.004**	1.011**
Male	1.004***	1.005***	1.016**
Income≤median	1.005***	1.005**	1.021***
Income>median	1.003*	1.004***	1.011**
Manual occupation	1.007***	1.008***	1.028***
Nonmanual occupation	1.003**	1.004***	1.010**

Notes: z-statistics under odds ratios. All regressions also include a constant and indicators for gender, noncompletion of secondary education (excluded), completion of secondary education, completion of postsecondary education, age less than 26 (excluded), age between 26-35, age between 36-45, age between 46-55, age above 55, married, currently smoking, labor income quartile, broad occupation and region where the P-G regressions also include log of time. Numbers under odds ratios are asymptotic z-statistics. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5 and 1 percent level. The sample is those people who were working in wage and salary jobs for the entire time we observe them and who start out with excellent or very good subjective health in wave eight. For the overall sample, there are 2,443 observations where 51% are censored.

Table 4. Selected Results for Hazard Ratios for Overall Subjective Health: Odds Ratio on Percentage of Time Spent in Performance Pay

These results are robust to variations in variables or estimation procedure, and serve as a lower bound of the negative effect if the endogeneity controls included are not capturing all endogeneity given the likely positive bias due to healthier workers selecting performance pay jobs. Performance pay can generate a variety of efficient labor market outcomes. However, the findings here are firmly in the camp of a potential unintended consequence of performance pay. Like other research that finds that performance pay can lead to workers, for example, focusing on quantity rather than quality or overusing physical capital, long term exposure to performance pay is related to worse health, suggesting that firms may face increased health insurance or workers compensation costs.

**Cottini, E, (2011)** investigates the relationship between health, working conditions and pay in Europe (OECD, 1996, 2008; Lucifora and Salverda, 2009). The decline of manufacturing jobs, the growth of service sector jobs and rapid technological progress put raising pressure for labour market flexibility, which led to a rapid diffusion of temporary contracts, low-paid jobs and part time work. It has been argued by the European Commission that low-paid workers suffer from a double penalty as their jobs are also of intrinsically bad quality. Standard economic theory commands that workers search for jobs that will provide higher utility, and quit any time this opportunity arises. If a worker has preferences for some non-wage attributes, this model predicts that in equilibrium the labour supply facing each establishment should be rising in both wages and non-wage components. Firms, by offering jobs that yield higher utility to the worker can attract and retain workers more easily. Non-wage components, such as job quality and workplace safety, are instruments to achieve a profit maximizing labour supply. While bad working conditions and low pay may harm workers' health, poor health can make it more difficult to search for jobs and more physically or mentally costly to work. Equally, illnesses may also increase absenteeism and reduce job performance, which can affect earnings, increase the probability of dismissal and reduce the chances of promotion. Employers may also discriminate against workers who have a physical or mental disability even when their performance is satisfactory. Knowing how health depends on work environment and employment arrangements is clearly of policy relevance as it provides key equity considerations to complement the efficiency argument advocated by employers (Bardasi and Francesconi, 2004). The extent of these problems seems to vary across countries according to the legal and social protection for worker's health and safety (Cox *et al.*, 2004). In this paper the 2005 wave of the EWCS is used to analyse the link between working conditions and low pay on health at work and provide cross-country evidence for 15 European countries. Results show that, controlling for personal characteristics, firm attributes, industry and occupational structure characteristics (adverse) working conditions are associated with poor health—both physical and mental at work. Low pay plays a role, mainly for men and when interacted with working conditions, suggesting that stigma and deprivation effects may be correlated with health at work. There is evidence that the association of health with poor working conditions is attenuated by the low-pay status. Women seem to derive their Health problems at

work from bad working conditions, while for men being low paid is strongly associated with bad health (Table 5).

	Healthgen (level=4)			Mentalh (level=2)			Physicalh (level=2)		
	All	Female	Male	All	Female	Male	All	Female	Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
WC	0.015*** (9.52)	0.0098*** (5.60)	0.023*** (8.07)	0.020*** (15.98)	0.015*** (8.54)	0.026*** (13.2)	0.009*** (5.22)	0.007 (0.01)	0.011*** (4.10)
LP	0.019*** (2.94)	0.0004 (0.07)	0.046*** (3.43)	0.021** (2.34)	-0.001 (-0.16)	0.041** (2.41)	0.0103 (1.54)	0.004 (0.00)	0.018* (1.65)
LP*WC	-0.006** (-2.59)	0.0009 (0.50)	-0.019*** (-3.34)	-0.005** (-1.96)	0.001 (0.57)	-0.013** (-2.53)	-0.005* (-1.86)	-0.0004 (0.01)	-0.011** (-2.06)

Table 5: Health problems at work

Even accounting for the potential endogeneity arising from workers sorting by firms and job types with different working conditions, the results support the hypothesis of a causal effect of (adverse) working conditions on the probability of experiencing health problems. Working conditions are an important determinant of health status at the workplace, and that health policies directed to workers should pay attention at improving working attributes and pay.

**Blasquez, Cottini and Herrarte (2011)** use the Spanish Living Conditions Survey (2005-2008) to investigate whether the socioeconomic gradient in health remains when alternative measures of socioeconomic status are taken into account. People in lower socioeconomic status groups have much worse health outcomes than those in higher socioeconomic groups (Fox, 1994; Nazaroo, 1998; Marmot and Wilkinson, 1999; and Smith, 1999). Which dimensions of socioeconomic status actually matter to determine agents' health status? The level of income has been a commonly used indicator. After controlling for significant determinants of health, such as sex, age, educational level or occupation, a striking relationship between self-reported health and income persists. Other forms of deprivation, apart from that of income, might also exert a significant influence on health status. Material deprivation is closely related to social exclusion, a concept that in the last years has received increasing attention among social scientists discussing the attributes, differences and novelties of it with respect to more traditional concepts such as income poverty, multidimensional poverty and inequality. This shift from the concept of poverty to material deprivation and social exclusion reflects the need for a multidimensional approach to study social disadvantage. In this respect, the multidimensional aspect refers to the failure to attain adequate levels of various functionings that are deemed valuable in the society (Sen, 1985). Another fundamental element identifying the concepts of material deprivation and social exclusion is relativity. Relativity comes from the idea that a person's feeling of deprivation in a society arises out of comparing his situation with those who are better off (Runciman, 1966). This paper makes an important contribution to the literature on the socioeconomic gradient in health. It examines the effect of material deprivation – in terms of financial situation, basic necessities, durables and housing conditions – on individual self-assessed health (SAH). The authors start with the “counting” approach of Atkinson (2003), and construct two deprivation indicators by summing up the number of dimensions in which the person is deprived, assigning respectively equal and different weights to the various dimensions considered. Then they follow Bossert et al., (2007), and define a third deprivation index as the product of two terms. The first term corresponds to the Yitzhaki (1979) index, that is, the average of the functioning-failure differences between a person and those who are better off. The second term, the share of agents with fewer functioning-failures, captures the capacity of an individual to identify with other members of the society. The results suggest a negative relationship between the deprivation indicators, in any of the life domains considered, and self-assessed health. This holds even when we consider a relative measure of deprivation (Bossert et al., approach), thus reflecting a comparison effect, by which unfavourable comparisons with the social peers depress individual levels of SAH. Information on health is derived from the question “How is your health in general”. It is a five-point response scale ranging from very bad to very good. The approach followed in this paper is to exploit the panel structure of the data and estimate a random effects model using Mundlak (1978) to allow for correlations between the individual random effects and the observable variables. Finally, as in Contoyannis et al. (2004), the authors carry out separate estimations for males and females. They find that the estimated coefficients of material deprivation are larger – in absolute terms – than that of income, which is found to be positive and between 0.02 and 0.025 among males, while considerably lower and non significant among females. These results confirm that the socioeconomic gradient in health is more latent when, apart from income, deprivation in a variety of life dimensions is considered to measure individual's socioeconomic status. Except the domain of *Financial Difficulties*, the larger differences with respect to income appear when the deprivation scores are based on Bossert et al., approach. This suggests the importance of unfavourable comparisons with the social peers in depressing individual levels of SAH. For instance, among males the coefficient representing the health effects of lower societal position in the domain of *Financial Difficulties* is of -0.122, significantly above the corresponding value – in absolute terms – to income. The same occurs in the rest of deprivation domains, with estimated coefficients of -0.109, -0.116 and -0.045 for the domains of *Basic Necessities*, *Housing Conditions* and *Durables*, respectively. A similar pattern is observed for the female subsample. However, as

it was mentioned before, negative comparison information (higher deprivation scores) in the domains of *Basic Necessities* (-0.152) and *Housing Conditions* (-0.154) exert major negative effects of health.

*Mertens and Beblo (2011)* ask whether the recent financial market crisis has caused a deterioration of satisfaction not only for the unemployed but also for those out of the labour force and especially those in employment. The focus of our analyses is on the pattern of life, job and health satisfaction over time and the influence of unemployment rates, inflation rates and GDP growth. We compare the UK and Germany, two countries with different employment protection regulations and different consequences of the crisis for the labour market. The authors found significant differences between the formerly separated parts of Germany even twenty years after re-unification. While people living in the western part of Germany report somewhat lower satisfaction in 2009 compared to the previous years, those living in the eastern part report higher levels than in 2006, the year before the financial crisis started (except for health satisfaction as illustrated in the Figure 10).

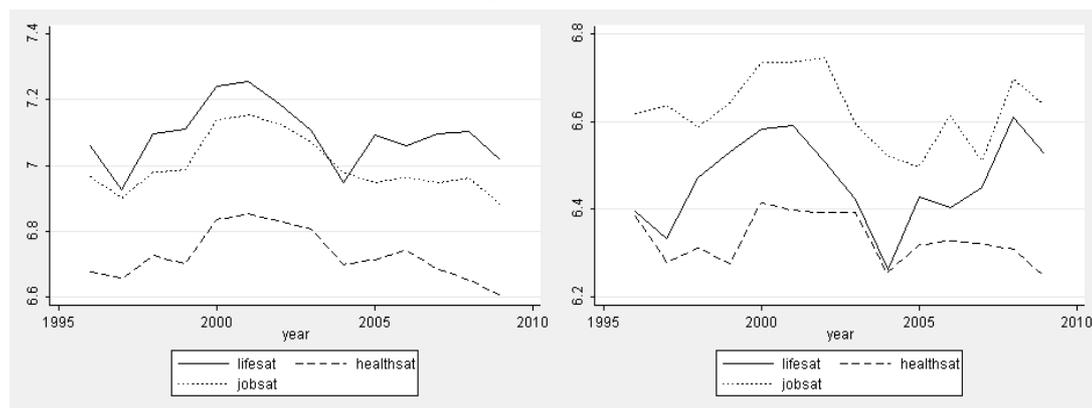


Figure 10: West Germany

East Germany

Source: Authors' calculations with SOEP 1996-2009

This could be due to the largely different employment structures in both parts of Germany. As exports and not so much services were hit by the crisis, western German federal states were facing stronger negative demand pressures. Our findings for the UK are similar to the East German evidence.

Looking at the impact of macroeconomic indicators such as GDP growth, inflation and unemployment, we find diverse effects for Germany and the UK. Positive reactions to an increase in GDP are observed in West Germany only. As illustrated in the Table 5 below, the strongest and most robust result across all the subsamples is detected for the relationship between self-reported satisfaction (regarding all aspects, life, job and health) and the regional unemployment rate: The higher regional unemployment the more satisfied people seem to be irrespective their current labour market status. Not only unemployed workers feel better when unemployment rises – a potential result of changing social norms in times of rising unemployment – but also employed workers who seem to be more satisfied with their lives and jobs when unemployment is rising around them. The overall level of unemployment has a significantly negative effect, though for Germans only. Interestingly, similar results are obtained when looking at job and health satisfaction. In the UK, the significance varies with the strongest effects on job satisfaction.

	Life satisfaction			Job satisfaction			Health satisfaction		
	Germany		UK	Germany		UK	Germany		UK
	West	East		West	East		West	East	
Crisis years	+/-	+	+	-	-	+	-	-	+
Temporary job in crisis years	+	+	+	+	+	+	+	+	+
GDP growth rate	+								
Inflation rate			-						
National unemployment rate	-	-	+	-	-				
Regional unemployment rate		+		+	+		+	+	
# obs	69,486	22,824	62,229	68,669	22,534	62,268	68,669	22,534	62,268

Table 8 Summary of the economic determinants of satisfaction measures

Note: Summary of the qualitative results of the paper. + indicates statistically significant positive relationship, - indicates statistically significant negative relationship.

*Blazquez, Cottini and Herrarte, (2012)* use the *Spanish Living Conditions Survey* (2005-2008) to investigate whether there is a socioeconomic gradient in self assessed health (SAH) when alternative measures of socioeconomic status, apart from income, are considered. Material deprivation in terms of financial difficulties, basic necessities and housing

conditions exerts a direct effect on individual health. Deprivation influences individual health through two channels. First, lack of monetary resources and/or inaccessibility to specific items has a direct negative impact on SAH. The second relates to comparison effects with the societal peers. Following Bossert et al. (2007), relative deprivation as the product of two terms: The first, is the average of the functioning-failure differences between a person and those who are better off (Yitzhaki (1979) index). The second is the share of agents with fewer functioning-failures, captures the capacity of an individual to identify with other members of the society. A multidimensional index of material deprivation is used. Since the relative deprivation effect is driven by unobserved factors correlated both with low income and poor health, the panel structure of the data is exploited to include individual effects by proposing a RE model extended to include a Mundlak term that allows for correlations between the errors and the observable variables. Since health dynamics may be influenced by gender (Contoyannis et al. (2004)), the authors carry out separate estimations for males and females and provide a series of sensitivity tests that support our results. In line with previous works (Graham 2007; House et al., 2005), the results provide evidence that socioeconomic gradient in health is not unidimensional. They find interesting differences regarding the influence of income and material deprivation on SAH. Higher distances between own income and others' income significantly depresses individual health, which supports the relative income hypothesis. Once comparisons in terms of income are considered as determinants of health, own income does not play any role. Additionally, material deprivation leads to a substantial decrease in SAH. However, unlike income, the SAH effects of being deprived in these domains mainly operate through a direct channel, with inaccessibility to specific items exerting per se a negative impact on health.

**Cottini, and Lucifora, (2010)** investigate the links between contractual arrangements, working conditions and mental health using time-series cross-section data for 15 European countries. In recent decades industrialised countries have experienced substantial changes in the functioning of labour markets and increased pressure for higher labour flexibility pursued by reforming labour market regulation and working arrangements (reducing employment protection legislation, introducing non standard work arrangements and, at the firm level, increasing demand over workers performance, demanding job tasks and lower worker's control). In most European countries, working conditions have progressively deteriorated (OECD, 2008). These changes are expected to impact on worker's health conditions and their overall well-being. The Mental Health Foundation, 2000 has recognised the prevalence and impact of mental health disorders in the working population. Employee performance, rates of illness, absenteeism, accidents and staff turnover are all strongly associated to employee's mental health status. Mental illnesses contribute to the burden of disease and disability benefits (Marusic, 2004; Heijink et al.2006; Mark et al. 2007). This paper contributes to the existing literature by documenting the links between working conditions and mental health for a large set of countries using comparable data (Figure below). All indicators of working conditions show a positive relationship with mental health problems such that countries with the worst combinations of psychosocial conditions and physical hazards also score badly in terms of worker's mental health.

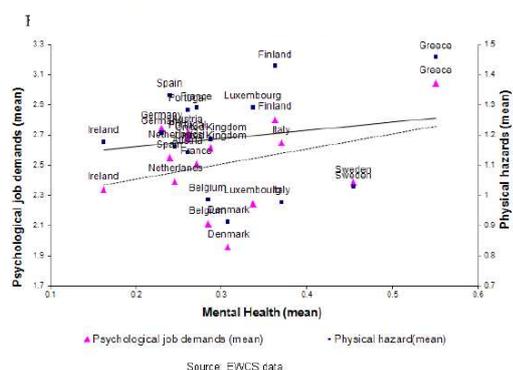


Figure 11: Correlation between mental conditions and health

EWCS 1995, 2000 and 2005 is used to investigate recent patterns in mental health at the workplace across 15 European countries, and to assess how working conditions - such as shifts, repetitive work, job autonomy, job intensity and job complexity and physical hazards - are related to worker's mental health conditions. The paper also investigates the potential sources of these differences accounting for personal characteristics, firm attributes, industries, occupational structure and the institutional context (as shown in the Table 11). As workers may sort across jobs according to their preferences and risk aversion, the potential endogeneity of working conditions and mental health within the workplace is assessed. Overall the results support the perception, currently debated world-wide, that adverse working conditions can affect worker's mental health conditions.

**Cottini E. and P. Ghinetti (2011)** aim to investigate whether employee health is affected by the environment in which the individual works in terms of both physical and psychosocial working conditions and by his or her lifestyle. The

period of rapid transformation and changes in the organisation of the production system has modified the work environment, with an increase in the share of atypical jobs and a reduction of hierarchical levels, as well as a growth of service oriented work. The traditional sources of adverse physical working conditions are declining, whereas the share of workers subject to psychological job stressors is increasing (Cappelli et al., 1997). A greater importance of "immaterial" job attributes such as stress and work overload relative to strenuous physical working conditions may have non neutral effects on health at work, with a worsening in its mental versus its physical component (OECD, 2008; Cottini and Lucifora, 2010; Cottini 2011). From a policy perspective, the EU commission has recognised the importance of several job quality dimensions and decent working conditions for the implementation of the European Employment Strategy (EU 2001) Whilst the relationship between lifestyle indicators and self-assessed general health – where the former plays an input role in the production of the latter - has been recently investigated (e.g. Contoyannis and Jones, 2004), the role that working conditions could play in the same context has not received the same attention yet. Adverse environmental job aspects and, more in general, organisational factors are important determinants of perceived health. Once the mental and physical health are considered separately, substantially different gradient relative to variables capturing differences in lifestyles and working conditions are observed. Overall, the causal effect of lifestyles and working conditions it is in general negative, but not as strong as one may expect, and it is concentrated on the subjective evaluation of health (Self-assessed health). When the more objective measures of mental work-related and physical health are considered many effects vanishes (with the exception of drinking and job insecurity) and, if any, they are concentrated on mental health.

**Cottini, Kato and Westergard-Nielsen, (2011)** using a Danish linked employer–employee data find that: (i) exposing the worker to physical hazards leads to a 3 percentage point increase in the probability of voluntary turnover from the average rate of 18%; (ii) working in night shift results in an 11-percentage point hike; and (iii) having an unsupportive boss leads to a 6-percentage point jump. High involvement work practices are found to play a significant role in mitigating the adverse effects of workplace hazards. Finally, the worker under adverse workplace conditions is found to improve the 5-year odds of rectifying such workplace adversities by quitting the firm. The study provides new evidence on the exit behavior of workers who are exposed to workplace hazards and the potentially important role that high involvement work system (a cluster of complementary human resource management practices designed to promote employee involvement) can play in mitigating such exit behaviour. Thus the paper integrates two very different streams of research: that of workplace hazards and that of high involvement work systems, and provides researchers, practitioners and policy makers with fresh insight on interplay between workplace hazards and high involvement work systems. The authors link the 2000 data to the 2005 data and study whether the worker exposed to adverse workplace conditions can improve her odds of rectifying such workplace adversities in 5 years significantly by separating from the firm voluntarily. By separating voluntarily from her firm, the worker exposed to physical hazards at the beginning of year 2000 can improve her 5-year odds of eliminating such physical hazard exposure by 17 percentage points. Since the average odds of escaping from physical hazards in 5 years is 40%, the estimated marginal effect of voluntary turnover amounts to almost a 50-percent increase. For all workers with bad boss, voluntary turnover will result in a 10-percentage-point increase in their odds of rectifying this adverse workplace condition in 5 years (which amounts to a 14-percent rise from the average 5-year odds of 70%). The worker without strong voice in the workplace can improve her odds of gaining such voice in 5 years by over 20 percentage points (which amounts to a 30-percent hike in the 5-year odds from the average odds of 67%) if she quits the firm. The data support that changing the firm voluntarily does boost the odds of improving workplace conditions in 5 years, even if such turnover does not accompany any change in occupation, industry, firm size, education, location, and wage (see Table 6)

Variable	Physical hazards		Improve in: bad boss		Voice	
	Marginal effect	Robust s.e.	Marginal effect	Robust s.e.	Marginal effect	Robust s.e.
Quit	0.169	0.040	0.113	0.060	0.222	0.064
Occupation switch	0.110	0.042	0.095	0.173	0.020	0.063
Region switch	0.155	0.089	-0.035	0.163	0.257	0.076
Industry switch	-0.014	0.036	-0.044	0.061	-0.198	0.064
Wage change	0.046	0.073	0.175	0.106	0.059	0.110
Education upgrade	0.094	0.098	0.082	0.132	0.055	0.109
Firm size switch	-0.004	0.061	-0.034	0.100	-0.187	0.100
Age in 2000	0.008	0.002	-0.006	0.003	-0.003	0.003
Number of observations	848		321		343	
Pseudo R <sup>2</sup>	0.04		0.035		0.073	

Table 6 Five years odds of workplace improvements with and without turnover

**Cottini (2011)** investigates how different dimensions of working conditions affect the health of female and male workers in 15 European countries. The impact of health problems at the workplace has serious consequences for the productivity of the firm. Poor health might results in higher absenteeism rates, lower productivity and performance. An adverse work environment may damage workers' health and make more difficult to search for jobs and more

physically or mentally costly to work. This paper Analysing gender differences, in empirical studies dealing with working conditions and health, has been shown to be very important (Bardasi and Francesconi (2004), Robone and Jones (2008)) as both health conditions and working arrangements can vary considerably according to the gender of the worker. It has been suggested that the increasing participation of women into the labour force over the last decades has positively affected their health, and may in fact enhance their health (Hall, 1992). This positive association could be explained by a selection effect, as women might exit the labour force because of health or family reasons. Even if women have the same job title as men, their specific job tasks are often different. Women are generally engaged in work activities different from those of men, thus they may be subject to different exposures (Stellman, 1994). Health responses to exposure may be different for men and women due to biological differences—such as the effects of body fat or endocrinological factors. Differences across gender in terms of quality of working conditions that affect health at work (Vermeulen and Mustard, 2000). This study includes the distinct effects of both physical and psychosocial conditions relating to the work environment (Cox, Griffiths & Rial-González 2000) on workers' health. Key mental conditions comprise psychosocial strain, work arrangements, and work organizational factors, whereas physical hazards typically focus on exposures such as noise and workload (Cox, Griffiths & Rial-González 2000, Stock et al. 2005). The contribution of both these dimensions on the health at work are studied. Given the cross country evidence we are able to make generalisations of results in a wider context compared to previous literature. The results suggest that controlling for a wide range of personal and job attributes, (adverse) working conditions are associated with more work related physical and mental health problems. It emerges a different pattern by gender (as shown in Table 7).

	FEMALE		MALE	
<b>Physical health</b>				
Physical hazards		0.012**		0.032***
Psychosocial job conditions		0.033***		0.041***
<b>Mental health</b>				
Physical hazards			0.013***	0.023***
Psychosocial job conditions			0.07***	0.097***
R-squared	0.082	0.072	0.089	0.084
Nobs	8035	8035	9126	9126

Note: \*\*\*1%, \*\*5%, \*10%. Sector, occupation, firm size, country fixed effects and cross national weights are included.

Table 7: Working conditions and health by gender

With respect to mental health at work, male workers suffer more from high work demands/ low job autonomy compared to female workers. A less clear pattern across gender is found with respect to physical health problems at work. Results persist also when controlling for the endogeneity of working conditions, in fact the instrumental variable estimation offers evidence in support of a causal effect of (demanding) working conditions on individual' health at work.

**Cottini and Buhai, (2011)** provide a fresh analysis of the theory of compensating wage differentials (CWD). The growing interest for job satisfaction data among labour economists has, for instance, generated a debate about the main factors explaining the worker's rating of her work environment (Clark, 2005). Many studies point out a trend of declining job satisfaction despite rising real wages. It is uncontroversial that non pecuniary work conditions are considered crucial job aspects by individuals searching for jobs. In seven OECD countries in the 1990s (Clark (2010)) employees overall do not rate income or hours as most important job features, the two aspects with highest ratings being job security and job interest, followed by work independence. These preferences appear consistent across the two genders. Job quality become an important economic policy issue, for instance through the definition of 'decent work' (ILO, 1999) or through the inclusion of 'employment quality' indicators in the European Employment Strategy. These definitions concern a wide series of job dimensions, like minimum wage level, job security, representation rights, job safety, training opportunities, all of which can be affected by recommended labour and social policies. The standard hedonic wage theory has been challenged by follow-up models of equilibrium search, (Burdett and Mortensen (1998)) extending their wage dispersion feature to dispersion of utilities that depend on both pecuniary and non-pecuniary attributes; existing search frictions in matching workers to firms might then lead to equilibria with different configurations of wages and amenities, where the slope of the worker's indifference curve need not equal the slope of the wage-amenities relationship, (Hwang et al (1998), or Lang and Majumdar (2004)). Most research based on estimation of hedonic wage equations has not been able to account for unobservables in the worker and the firms utility This paper proposes a bridge between these competing explanations, using to that end uniquely suited Danish data, controlling for both worker and firm time-invariant unobservables, and for the sorting of workers cross jobs according to their attitudes towards risk, in the conventional hedonic wage framework. The study compares the range

of CWD estimates with duration model estimates obtained using the worker employment histories, as justified by the utility dispersion equilibrium-search framework.

*Lucifora C. and F. Origo, (2010)* draw the attention that in recent years many countries of the European Union (EU) have implemented comprehensive smoking bans to reduce exposure to tobacco smoke in public places and all indoor workplaces. This paper contributes to the literature in the following ways. First, the focus is on the effects of a specific type of public smoking control policy – the so called “comprehensive” smoke-free law -- on workers’ health within workplaces. These types of smoking bans, covering all public indoor places and all workplaces (either public or private), represent one of the pillars of the EU smoking control policy and in recent years have been implemented in most of the EU Member States, while little is still known about their effects on workers’ health. Second, they use comparable micro-data for a large number of (European) countries to study the effect of smoking control policies both on exposure to smoke, as well as on direct measures of workers physical health (such as the presence of respiratory problems). In the Table 8 reports the TCS for the two available years, presenting for each EU-15 country both the overall score and the specific score for comprehensive smoking bans. Countries are ranked according to the date of introduction of such smoke-free laws.

Comprehensive smoking bans and the Tobacco Control Scale (TCS)					
	Date of 1st comprehensive smoking ban	TCS 2005		TCS 2007	
		Smoking bans (max 22)	Total (max 100)	Smoking bans (max 22)	Total (max 100)
Ireland	March 2004	21	74	21	74
Italy	January 2005	17	57	17	57
Sweden	June 2005	15	60	15	61
Belgium	January 2006	8	50	13	58
Spain	January 2006	3	31	15	55
UK	March 2006–July 2007	1	73	21	93
Luxembourg	September 2006	4	26	11	36
France	February 2007 and January 2008*	6	56	12	59
Finland	June 2007	12	58	12	58
Denmark	August 2007	2	45	3	45
Germany	August 2007–2009	2	36	2	37
Portugal	January 2008	5	39	5	42
Netherlands	July 2008	9	52	9	50
Austria	January 2009	4	31	4	35
Greece	July 2009	7	38	7	36

Note: Countries are ranked according to the date of introduction of a comprehensive smoke-free legislation. For more details see Joossens and Raw (2006).  
 \* Comprehensive smoking bans were introduced in February 2007, but the deadline was extended to January 2008 for bars and restaurants.

Table 8 Comprehensive smoking bans

The empirical strategy exploits variation in the timing and design of smoking control policies, as implemented by various countries, to assess the causal effect of comprehensive smoking regulations on workers perceived health using a quasi-experimental approach (i.e. a ‘Diff-in-Diff’ estimator). Whether such bans may produce some “unintended” effects within workplaces beyond those expected on risk exposure and workers smoke-related health is investigated.

*Lucifora C. and F. Origo, (2010)* provide some details on the diffusion of comprehensive smoking bans in Europe. The authors outline a methodology to measure and compare tobacco control policies across EU countries. Then they present new evidence on the effects of comprehensive smoking bans in European workplaces, considering not only exposure to smoke, but also measures of workers’ perceived health – such as the presence of work related respiratory problems – that should be directly affected by these policies, as shown in the Table 9. They finally discuss whether

EU-15 country	2000	2005	Diff 2005–2000
1 Ireland	0.054	0.115	0.062
2 Italy	0.182	0.188	0.006
3 Sweden	0.182	0.233	0.050
4 Belgium	0.179	0.147	-0.032
5 Spain	0.129	0.121	-0.008
6 UK	0.123	0.085	-0.037
7 Luxembourg	0.117	0.188	0.071
8 France	0.198	0.159	-0.039
9 Finland	0.164	0.152	-0.011
10 Denmark	0.077	0.156	0.079
11 Germany	0.082	0.057	-0.024
12 Portugal	0.074	0.171	0.096
13 Netherlands	0.088	0.119	0.031
14 Austria	0.060	0.079	0.019
15 Greece	0.243	0.362	0.119
"treated" (countries 1–3)	0.140	0.180	0.040
"controls" (countries 4–15)	0.124	0.144	0.020
diff-in-diff estimate			0.020

Source: Own calculations based on Third and Fourth European Working Condition Survey.

Table 9: Share of workers reporting work related anxiety or irritability

comprehensive smoke-free laws may have “other” effects both within and outside the workplace which may partly offset the (positive) effects on smoking behaviour and health.

*Böckerman Petri, Pekka Ilmakunnas and Edvard Johansson, (2011)* argue that creative destruction is a key process underlying so-called firm dynamics, has been assessed to contribute significantly to the productivity growth observed in economies around the world. The creative destruction process entails simultaneous job creation and destruction and, consequently, induces worker flows. One can easily envisage that a job in an establishment characterized by rapid hiring and firing may be considered to be worse than a job in an establishment characterized by slower worker turnover, as rapid turnover means more uncertainty regarding the future. Increased uncertainty about future job prospects may, in turn, affect employee well-being in the form of reduced job satisfaction. The potential effects of

labour market turnover on employee well-being are particularly important, because job dissatisfaction has been shown to be associated with a multitude of ‘negative’ activities. These include lower job performance, increased absenteeism, more actual and intended job switching, as well as various discretionary activities, like less voluntary overtime, less pro-social activity and less adaptive behaviour. All these are likely to increase the costs of workplaces. Job dissatisfaction is costly also from the society’s point of view, if it leads to early retirement or withdrawal from the labour market. The study examines empirically whether a faster pace of creative destruction tends to negatively influence job satisfaction, using a unique dataset for Finland constructed from the European Community Household Panel (ECHP) for the years 1996–2001, and the Finnish Linked Employer–Employee Data (FLEED). The results show that if the wage can fully compensate for potentially negative effects of uncertainty in establishments or industries with a high turnover of employees, then this uncertainty should have no effect whatsoever on job satisfaction. In contrast, if this unfavourable job characteristic is not fully compensated for in the form of higher wages, then the uncertainty induced by increased job and worker flows can be expected to exert a negative influence on job satisfaction. The results indicate that employees do obtain compensation for intensive restructuring at the establishment level, whereas the impact of this uncertainty on employee job satisfaction is found to be negligible. The significant effect of a high pace of turnover on real wages and insignificant effect on job satisfaction give consistent support for the existence of compensating wage differentials for uncertainties at the establishment level. At the industry level, high labour turnover seems to have no effect on real wages or on job satisfaction. Hence, compensation for uncertainty occurs at the establishment rather than at the industry level. The establishment- rather than industry-level volatility is the relevant source of uncertainty among the employees. However, the results also indicate that the relationship between job and work flows, and wages or job satisfaction involves important elements of non-linearity.

*Mazzolini G., (2011)* argues that accidents at work are unforeseeable random shocks that could result in serious health problems or deaths for workers involved. The role of workplace conditions and safety at work in reducing the probability of accidents at work and the duration of absence following an injury is investigated using the EWCS data. Following Lanoie (1991), the endogeneity in the provision of safety at work is accounted for. Endogenous selection arises from two different sources. Differences in risk aversion may influence workers' career preferences entailing a selection effect. Employers' behaviour may also affect safety at work when they choose safety expenditures national laws and regulations and for achieving quality management certifications. Thus controls for cross-country differences in occupational health and safety regulations and for innovations in organizational practices are included. The main results show evidence of an inverse relation between safety at work and accidents. An increase of 1 percent of safety at work standards may reduce the probability of an accident of 2.7 percent and the duration of absence of 46.2 percent. When separate analyses are performed by personal characteristics, firm attributes and working conditions, we show that the effect of safety at work in reducing the probability of an accident is statistically significant when a job is characterized by an intrinsic risk at work. Increasing safety at work standards does not produce effects on workplace accident rates, where occupational risks are limited and workers are almost never exposed to dangerous agents.

*Schneider, and Beblo (2010)* argue that the state of occupational safety and health, Germany has achieved a high level of safety and health at work (BAMS and BAuA 2009), decreasing numbers of occupational diseases and accidents. Working conditions and the structure of the labour force have been subject to rapid changes which have come along with new challenges for safety and health at work. These labour market changes affect the mental health of employees as work-related mental problems are often associated with poor working conditions and non-standard employment OECD (2008). Academic re-search on the determinants of OSH indicators focuses mainly on sickness absence and early retirement. Most studies are based on the GSOEP, a rich micro-data panel, albeit without information on health. The empirical analyses are not always convincingly addressing or correcting for methodological problems such as reverse causality, unobserved heterogeneity or measurement error. These types of problems may cause standard regression methods to produce biased and/or inconsistent estimates that cannot be interpreted unambiguously. Furthermore, the causal impact of working conditions on health outcomes is not clearly established and measurement errors are likely to occur.

*Latreille, Jones and Sloane, (2012)* use a unique set of questions included as part of the 2001 British Social Attitudes Survey to consider the determinants of individual employee perceptions of a global measure of workplace health and safety that abstracts from the risk and other potential biases associated with more conventional measures such as perceived risk. A substantial literature considers the factors associated with perceptions of individual risk, while a related body of work has focused on how risk might be compensated for with appropriate wage differentials. The former potentially suffers from well-established cognitive biases which leads individuals to understate their actual risk, while aggregation issues beset the latter (Pouliakas and Theodossiou. 2011). Among psychologists and practitioners, a focus has been on conceptualising and measuring so-called ‘safety climate’ and its relationship with safety performance. The former is usually constructed using factor analysis of questions, with the elements often varying among studies according to the survey instrument used. This is typically then linked to measures of safety

performance such as workplace accident rates using structural equation modelling with various mediating and moderating factors posited. The current study seeks to avoid such problems by considering a simple, single, global measure of perceived *workplace* health and safety, essentially treating this as a measure of workplace well-being for a representative sample of employees and former employees drawn from a cross-section of occupations and industries. The results show that even after controlling for a wide range of individual, job and workplace characteristics, individuals with previous experience of accidents at work and of work-related ill health, regard their workplaces as less safe and healthy than those without such exposure, as do those who were aware of instances affecting others at the workplace. The impact of individual experience is found to be greater the more recent was the accident or health problem and if with the current (or for those no longer working, last) employer. Conversely, workplace health and safety is found to be higher in workplaces with a safety officer, with regular consultation on health and safety issues, and where the organisation complies with the requirements around safety posters/leaflets.

**Dodd, Drakopoulou, (2011)**, argues that the family firm organizational form is an important element of even the most modern industrial landscape. Dramatic examples of the workplace risks run by family business managers are staple ingredients of the news media. Although little empirical data is available specifically studying this labour market group, nevertheless “anecdotal evidence has long suggested a high degree of chronic stress among the self-employed” (Jamal, 1997: see also Akande 1994; Boyd and Gumpert 1983; Yusuf 1995). Jamal (1997) found that self-employed workers reported higher levels of stress and psychosomatic health problems than salaried employees. Whilst comprising just 7% of the US workforce in 2004, the self-employed made up 20% of workplace fatalities (Pegula, 2004). It thus appears that (small) business owner-managers are an especially vulnerable group, in terms of occupational health and safety. One of the principle elements within the SME environment is that of kin involvement in business ownership and management. The family firm remains a significant economic form across Europe, and beyond, and is not only to be found within the SME sector - which it dominates. Many very large businesses indeed exhibit this ownership and management structure. The interactions between family and enterprise create very specific health, safety and stress factors, some of which may be seen to be generally positive, and others quite the reverse. Characteristics of the 3 family firm which can be anticipated to reduce exposure to health and safety risks include strong organizational identity and engagement, and heightened social support within the workplace. Family-firm specific dangers comprise, inter alia, the transfer of domestic conflict to the working environment, kin rivalry and the taking of heightened risks to support one’s family. It is perhaps surprising that this topic has received very little attention indeed, in spite of its clear importance. The aim of this study is to develop an initial, tentative conceptualization of health and safety at work, within the family firm context. The methodology utilized will combine an extensive literature review with the development of a basic conceptual framework, and use findings from family firm research to illustrate and underpin this model. In line with common practice a family firm is defined as a business enterprise where ownership control is held by two or more members of a family (or a partnership of families); there is clear strategic influence by family members on the management of the firm; there is a real concern for family relationships, and where we can observe the dream (or the possibility) of continuity across generations.

(v) *Research on Demographic Effects and OSH*

**Sloane, Jones, Latreille, and Staneva, (2011)** use the fourth EWCS (2005) to examine the impact of age on work-related self-reported health outcomes. As the proportion of the workforce aged 55 and over continues to grow – a trend given additional impetus by recent or proposed raises in the (statutory) retirement age in several European countries including the UK, France, Germany, Spain, Italy and Greece – closer examination of the work-related health of older workers is imperative. However, most research into the relationships among work conditions and health has not explored age as a variable of explicit interest, instead treating it as a potential confounding factor, either ‘partialled out’ statistically or simply ignored (Griffiths, 2000). The aim of the current study is therefore to investigate age differences in a battery of self-reported work-related health measures using cross-country data from the 2005 European Working Conditions Survey (EWCS). Five work-related ‘outcomes’ are used to assess overall work-related health and well-being: health and safety risk perception; mental and physical ill health; sickness absence; injury rates; and work-related fatigue. However, since the EWCS contains information on working respondents only, a key issue for the analysis is to account for a potential ‘healthy worker effect’. This effect arises if older workers still in the labour market have better underlying health than those who leave employment, a source of selection bias (Li and Sung, 1999). We address this issue by making use of an external data source – the European Social Survey (ESS) – in order to account for labour market non-participation, adapting the Wolinsky *et al.*, (2009) re-weighting approach based on propensity scores for being in employment. In particular, the employment model estimated with 2004/05 ESS data is used to predict probability weights, and the inverse of these are then used to weight the observations in the main EWCS-based data models. In summary, the results which do not adjust for selection or endogeneity find that older workers are no more likely to report work-related health problems than those of prime age. Controlling for the endogeneity of working conditions does not affect this qualitative pattern of results. However, once selection bias is

accounted for, those aged 55-65 years tend to be at *higher* health and safety risk. Accounting for the ‘healthy worker effect’ thus has a substantial and demonstrable impact on the results for older workers.

*Economou, and Theodossiou, (2011a)* examine the relationship between recessions (approximated by country unemployment rates) and fatal and non-fatal work accidents. The literature provides ambiguous conclusions; the empirical findings are sensitive to the choice of countries or occupational sectors and to the time period examined. The present study revisits the issue of the work accidents/unemployment rate relationship using a panel of thirteen European Union countries (Austria, Belgium, Cyprus, Denmark, Finland, France, Greece, Ireland, Italy, Portugal, Spain, Sweden, UK) for the time period 1980-2006 and disaggregated by industry fatal and non-fatal work injury rates. The first step in investigating the unemployment rate/accidents at work relationship is the estimation of the Fixed Effects and Random Effects specification model for the fatal and non-fatal work accidents. The results show that after controlling for the country level of GNP per capita, a negative and statistically significant relationship between national unemployment rates and both fatal and non-fatal work injury rates is observed. The study takes into account cross-panel correlations and groupwise heteroskedasticity and distinguishes between the temporary and permanent effects of unemployment on both fatal and non-fatal work accidents. In doing so, the Mundlak (1978) decomposition methodology is utilized and the following regression models are estimated:

$$\ln \text{Fatal Work Accidents}_{it} = \tilde{a}_i + b_1 \cdot (\ln UR_{it} - \ln \overline{UR}_i) + b_2 \cdot \ln \overline{UR}_i + b_3 \cdot GDP_{it} + S_i + \varepsilon_{it}$$

$$\ln \text{Non-Fatal Work Accidents}_{it} = \tilde{a}_i + b_1 \cdot (\ln UR_{it} - \ln \overline{UR}_i) + b_2 \cdot \ln \overline{UR}_i + b_3 \cdot GDP_{it} + S_i + \varepsilon_{it}$$

The term  $[b_1 (UR_{it} - \overline{UR}_i)]$  expresses deviations from the country average unemployment rate and measures the *temporary* effects. The term  $[b_2 \cdot \ln \overline{UR}_i]$  expresses the difference in the country average unemployment rates and measures the *permanent* effects.

Table 10 shows that there is a transitory negative relationship between the unemployment rate and the fatal work accidents. There appears to be a significant positive permanent effect. The pattern is similar when the effect of recession on non-fatal work accident rates is examined. The transitory effect of recessions on non fatal work accidents is negative and the permanent effect of recessions on non fatal work accidents is strongly positive. The above mentioned results are uniformly consistent with the results obtained after the industrial disaggregation, with two exceptions namely the *manufacturing* and *agriculture* sectors where there is evidence of a transitory underreporting of non fatal work accidents and injuries. The results may imply that at the initial stages of the economic downturn work accidents tend to decrease as the slowdown of production reduces the number of job shifts, ease the work intensity and the proportion of newly hired and less inexperienced workers decrease as last-in-first-out dismissal practices are implemented by employers who are keen to retain their most experienced workers. Furthermore, the job creation rate greatly declines and this further reduces the proportion of the inexperienced workforce. This entails a reduction in the incidence of work accidents and injuries. Hence, the transitory effect of the unemployment rate on the incidence of fatal and non-fatal work accidents is negative.

Short-run and Long-run Effects of unemployment on fatal work accidents; FGLS with Mundlak Transformation										
Total	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9	
<i>Fatal Work Accidents, FGLS</i>										
Temporary UR	-0.123*	0.067*	-0.020*	0.074*	0.006	-0.177*	-0.035*	-0.051*	-0.037*	-0.040*
Permanent UR	0.643*	0.305*	-0.036*	0.254*	-0.055*	0.049*	0.015	0.193*	0.042*	0.136*
GDP	0.024*	-0.014*	-0.002*	-0.030*	0.005*	-0.033*	-0.012*	-0.005*	-0.003*	-0.006*
Year Effects	Yes	Yes								
Obs.	312	208	200	208	210	210	200	225	192	176

Short-run and Long-run Effects of unemployment on non-fatal work accidents; FGLS with Mundlak Transformation										
Total	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9	
<i>Non-Fatal Work Accidents, FGLS</i>										
Temporary UR	-0.371*	-0.555*	-0.086*	-21.190*	-0.115*	-0.713*	-0.469*	-0.263*	-0.275*	-0.501*
Permanent UR	1.864*	1.894*	2.666*	22.221*	1.564*	1.715*	2.289*	2.107*	2.626*	1.663*
GDP	0.0001	0.0004*	-0.00002	-0.002	0.00003*	0.0001	-0.00003*	0.000001	0.0001*	-0.0001*
Year Effects	Yes	Yes	Yes	Yes						
Obs.	220	198	153	198	198	198	198	198	198	153

Notes: See Tables 2 and 4.

Work accidents and country UR are expressed in logarithms. \* indicates statistical significance for p<0.05 and \*\* indicates significance for p<0.10.

Sector 1: agriculture, hunting, forestry and fishing; Sector 2: mining and quarrying; Sector 3: manufacturing; Sector 4: electricity, gas and water supply; Sector 5: construction; Sector 6: wholesale and retail trade, repair of motor vehicles and motorcycles, and personal and household goods, hotels and restaurants; Sector 7: transport, storage and communication; Sector 8: financial intermediation, real estate, leasing and business services; Sector 9: public administration and defense, compulsory social security, education, health and social work, other community, social and personal service activities.

Table 10: Short term and long term effects of unemployment on OSH

However, at later stages of the recession, cost cutting practices by employers may affect the OHS investments as firms reduce their expenditure on training and safety equipment and/or workers in employment, facing an increased risk of job loss, tend to undertake far riskier job tasks in a world of scarce employment opportunities. Furthermore, high unemployment severely weakens the ability of the trade unions to protect their rank and file from the degradation of the health and safety standards or succeed in improving the OHS procedures. Hence, the permanent effect of unemployment on work accidents becomes positive. Conversely, at the initial stages of economic expansions, an increase in work intensity occurs as firms react to the pressure of increasing aggregate demand. This effect is

reinforced by the reluctance of employers to hire new personnel before they are confident that the increasing demand is long lasting. Hence, there is an increase to hours of work and an increase to the pressure for increased productivity of the workers which might induce them to be less careful with safety procedures. With the passage of time as the economy adapts to the improved state of affairs, productivity improvements during economic expansions encourage firms to invest in occupational health and safety capital. As the bargaining power of labour unions improves during economic expansions, their increased concerns and pressures towards employers to increase workplace safety contributes to the decrease of workplace injuries. Thus the permanent effect of unemployment rate on work accidents turns out to be positive.

*Economou and Theodossiou, (2011)* note that the empirical evidence on the relationship between unionization and workplace injuries is conflicting most likely due to endogeneity. Indeed, workplace injuries are affected by increased unionization but at the same time, workplace injuries may also affect the degree of unionisation since high accidents rates may motivate workers to organise in unions in order to protect themselves from the hazardous working conditions. The present study investigates the effect of unionisation on work-related injury rates using a panel of ten European Union countries (Austria, Denmark, Finland, France, Ireland, Italy, Portugal, Spain, Sweden, UK) during the period 1982-2006. The degree of unionisation is approximated by the union density index. In order to take into account the time persistence in work injuries and the endogenous nature of the work injuries – unionisation relationship, system GMM regression techniques are utilised. The main variables of interest are “*Total fatal injury rates per 100,000 employees*” and “*Total non-fatal injury rates per 100,000 employees*”. The independent variables of interest are “*Union density*” and “*GDP per capita (in PPP)*”. The instrumental variable used to control for the endogenous relationship between work injuries and union density, is the “*days lost due to strikes and lockouts per 100,000 employees*”. Two methodological shortcomings are addressed; the dynamic nature of work-related injuries, since the experience of a work related health problem at present may be affected by work related health condition suffered in the past, and the endogenous nature of the relationship between trade union density and work injuries by the use of system GMM models. The results are presented in Table 11.

The Effect of Unionisation on Work Injuries		
Independent Variable	Dependent Variable System GMM	
	Fatal Injuries	Non-Fatal Injuries
GDP	0.0001 (0.14)	-0.047 * (-2.63)
Union Density	-0.344 * (-1.97)	-0.030 ** (-1.63)
Non Fatal Injuries <sub>t-1</sub>	0.222 (0.61)	-0.365 (-0.55)
Trend	-0.186 (-0.77)	-0.008 (-1.61)
Constant	20.296 * (1.97)	2.314 ** (1.86)
Wald chi2	60.47 (0.00)	27.30 (0.00)
AR(1)	0.927	0.435
AR(2)	0.900	0.291
Sargan test	0.416	0.115
Observations	230	147

\* indicates statistical significance for p=0.05 and \*\* indicates significance for p=0.10. Robust standard errors are calculated. T-statistics are reported in parenthesis. Probabilities are reported for AR(1), AR(2) and Sargan test. Non-fatal injuries index is divided by 10,000 and GDP is divided by 1,000,000 for the easier presentation of the findings.

Table 11: The effects of unionisation on OSH

Union density appears to be a strong determinant of work-place fatalities. An increase in union density is associated with a lower rate of fatal work injuries, indicating that increasing union density helps unions to achieve better outcomes on occupational health and safety conditions. The findings are similar when one considers the effect of union density upon non-fatal work injuries. Non-fatal work injury rates move procyclically to economic conditions as approximated to country GDP. These findings suggest that during economic expansions non-fatal work injuries are decreased and this may be attributed to the higher investment on occupational health and safety issues undertaken by employees at periods of economic booms.

*Drakopoulos and Theodossiou (2011)* point out that many studies on individual beliefs concerning risk have shown that people often underestimate and/or overestimate risks. For instance Kahnemann and Tversky (2000) suggest that in decision making people consistently underestimate outcomes that are merely probable, in comparison with outcomes that can occur with certainty. They also argue that individuals are unlikely to perform the operation of subtracting the cost from the outcomes in deciding whether to buy a gamble. In addition, there is ample empirical evidence concerning similar behaviour towards risk in the context of occupational environment. Much specialist scholarship indicates that workers constantly underestimate their exposure to work risk for work accidents, since perceptions of risk are influenced by pre-existing, recent or readily available experiences (Thaler and Sunstein, 2008) or overestimation of personal immunity from harm (Weinstein, 1989). This paper studies the repercussions of the above theoretical developments in the occupational safety and health framework (OSH) when the workers systematically underestimate job risks. In doing so the paper first briefly reviews the standard debate relating to the implementation of OSH. Although, it is generally accepted that there is a need for regulation in the case of job risk underestimation, there is no much work regarding the type of appropriate regulation. The paper provides a discussion of the types and

impact of regulation on health and safety effort in a simple framework, in which workers beliefs concerning accident risks at workplace interact with the behaviour of Health and Safety regulator. One can investigate the above in a simple framework utilising research on risk perceptions. A discussion of the general case of the difference in beliefs concerning risk perceptions and regulation can be found in Viscusi, (1998); Salanie and Treich, (2009). In the specific context of safety at work, one can assume that there is a difference concerning the assessment of a job risk between workers and the work safety regulator, and that there is agreement between the two parties concerning all other preferences. Contrary to the standard approach, the health and safety regulator does not impose a maximum level of job risk but instead he/she adjusts the level of effort to work safety. The paper shows that a particular type of regulatory intervention is necessary for the risk underestimating workers not to suffer a welfare loss.

**Ferrer-i-Carbonell, Haafkens and Theodossiou (2012)** investigate the preferences of the employers and employees regarding aspects of *occupational safety and health* (OSH). The provision of OSH is determined by the interplay of preferences of workers and employers. Hence, the need for a though understanding of the determination of the preferences of both workers and employers on OSH is of critical importance in order to identify areas of required action and to set priorities for policy initiatives on improving health and safety at work. The need to focus on health and safety is important since the interplay of preferences of workers and employers need to be completed by OSH strategies designed to address the consequences of a continuous adaptation. From the employers' side a sufficient condition for profit-maximising is that optimal OSH level should equalise the OSH costs and OSH benefits at the margin. The outlays associated with improvement in workplace conditions (preventative practices, OSH training and the like) rise as the level of health and safety increases. The benefits are associated with having to pay lower ('compensating') wages and with the reduction of workplace injuries and illnesses (lower level of sickness absence and sick pay and the like). It is therefore clear that firms differ in their ability to trade-off the costs of providing a safer working environment with the expected benefits (particularly, a lower wage bill). For the workers' side it is assumed that rational workers, who possess perfect information and exhibit a high degree of labour market mobility, demand a wage premium as compensation for their willingness to assume elevated occupational health and safety risk. In order to maintain expected utility constant, a given worker will therefore demand higher levels of wage compensation for higher degree of job risk. Inefficiencies are likely to arise since competitive markets require the existence of full information between the two sides of an employment relationship regarding workplace risks. Recent research has employed the *stated preferences methodology* of estimating the "willingness-to-pay" (WTP) of individuals for OSH. Subjective WTP estimates typically utilise survey methods in order to elicit the magnitude of the rate at which individuals (employers or workers) are willing to forgo income in exchange for additional OSH, which would nevertheless keep their utility unchanged:

$$WTP = \frac{\partial w_i}{\partial r_i} \quad (1)$$

where in a perfectly competitive labour market and applicable to a range of risk increments  $r$  for income  $w$ . Eliciting subjective evaluations of by survey respondents is a useful tool for the understanding of preferences. This paper is a first attempt to investigate the workers' OSH preferences and to compare them with those of the employers after controlling for a host of personal, occupational and firm characteristics. The study uses conjoint analysis. This involves choices or evaluation responses by an individual concerning various OSH initiatives. This study contributes to the growing literature on OSH. At this stage of the research agenda, it is crucial to understand and operationalize the WTP tool for the two participants in the labour market in order to understand their motivations regarding economic decisions for OSH

The data for this study are derived from the identical HEALTHatWORK project surveys, among employers/human resource managers and manual workers in the Netherlands, and the U.K. via an Internet survey. The sample consists of firms or employes/ Human resource managers or non administrative workers. Individual respondents are obtained from the databases which are maintained by the interviewing company (SYNOVATE, NL).

The estimated coefficients show that he most relevant OSH attributes for the employees seem to be those related to accidents and incidents and the risk assessment. These are followed by work illness investigation and whether there is safety and health training offered by the employer. The least important OSH attributes are those relating to caring for the injured and how the company plans and facilities their return. The results for the employers or human resource managers indicate that the most relevant OSH attributes for the employers or human resource managers are, as in the case of employees, those related to accidents, incidents and the risk assessment. In addition, employers also value safety and health training (more than employees do). In contrast, the employers or human resource managers appear to value work illness investigation less important (in contrast to the employees). It appears that respondents reply strategically flagging that they do not care about costs but only about the OSH improvements. This issue calls for

further careful research in the appropriate survey methodology to circumvent this strategic behavior from the part of the employers or human resource managers.

*Pecitto et al (2012)* use a willingness-to-pay of company executives for occupational safety and health (OSH) as an attempt to specify whether and how much, company executives value the health and safety of company workers. The study was performed as part of "HEALTHatWORK" research programme under 7th Framework Programme of the European Commission (FP7). The willingness to pay data has been collected among 147 representatives of managers from 25 medium- and big-sized enterprises in Poland with use of a questionnaire. Findings obtained show that 70-80% of the managers interviewed are willing to increase expenditures on different activities aimed at improving occupational safety and health performance in their companies. The research output allows the evaluation of company managers' willingness-to-pay to increase the OSH costs. The analyses results show that the managers are ready to increase the spending by an average of about 30% in respect of measures to reduce accidents at work. The important finding is that managers believe that increasing workers engagement in this type of activities is vital because they declared the willingness to increase the spending on this account by about 37% on the average, and to augment the cost of OHS training and information dissemination by 34%. The relatively largest spending increase, by about 38% on the average, was declared regarding the measures aimed at reduction of work related stress. It needs to be reminded that the declarations concerned the increasing of spending to be incurred in the future as compared with the current level of spending for a given purpose. Majority of respondents did not specify the current spending amounts, which could also affect their tendency to increase spending. Given the fact that the respondents could not estimate the amounts of the OSH costs incurred in their companies (only two respondents answered a question about such costs), the study did not allow to assess directly the willingness of the company management to incur the costs of occupational health and safety in monetary terms.