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# ABSTRACT

## Work-Related Stress, Quitting Intentions and Absenteeism

The paper uses data from the International Social Surveys Program (ISSP) to investigate work-related stress among a group of 15 OECD countries. It examines the determinants of work-related stress and explores the importance of work-related stress as a predictor of individuals' quitting behaviour and the rate of absenteeism. We find that those individuals reporting to experience at least some stress in their current position are 10 - 14 % more likely to hold intentions to quit or be absent from work than those without any job stress, with the probability of intending to quit or being absent increasing with successively higher work-related stress levels.

JEL Classification: J22, J28, J63, I10

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## 1. Introduction

There has been a growing belief that the experience of stress at work has undesirable consequences for organisations and the health of their employees. Employers and governments have increasingly come to realise the high costs of stress in terms of the financial damage inflicted upon individual firms, and the economy in general, through employee sickness, poor productivity, staff turnover and work accidents. In a recent report, The European Agency for Safety and Health at Work found that 28 percent of workers in the European Union reported stress-related health problems. This amounts to 41 million EU workers affected by work-related stress each year and around 600 million working days per year lost across the EU for work-related health reasons. In addition, the British Health and Safety Executive (1990) revealed that at least half of all days lost in the UK were due to stress related illnesses. The cost to Britain's economy is estimated at approximately 6.7 million days lost per year, costing society between £3.7 and £3.8 billion.

The study of occupational stress and its health consequences constitutes a major area of research in the behavioural sciences. Studies of specific stress-related illnesses feature prominently in the medical literature, while in occupational psychology work-related stress has been linked to both physical and psychological health problems across a broad section of the working population. Individuals under stress are reported to suffer adverse personal health, including ulcers, high blood pressure, heart attacks or even death and studies in the behavioural sciences have shown that poor employee performance, absenteeism and high labour market turnover are all linked to worker stress (Porter and Streers, 1973). Three issues, therefore, arise in considering the effect of work-related stress on individual organisations and the economy in general: how should work-related stress be specified, what determines its presence at the workplace and what is its importance as a predictor of individuals' labour market behaviour?

With regard to the first issue, this paper does not explore alternative specifications of work-related stress. Instead it uses a self-reported measure of perceived work-related stress to focus on the last two issues. Individual reports on perceived levels of psychological or mental strain is one of the two specifications used in the literature to measure work-related stress. The other specification is measuring work-related stress by its physical or psychological effects[1].

[1] Common forms of psychological distress are cited as depression, job burnout, anger and sleep disturbances (see for example MacFadyen and Prince 1996), whilst in the medical literature distress appears in the physical form of backaches, headaches, ulcers, cardiovascular problems, high blood pressure and heart disease (Quick et al, 1990).

However, such physiological measures are problematic, since a number of factors may influence health other than work-related stress. Similarly, questions focusing on one aspect of work-related stress such as mental demands or fatigue may exclude other important sources, such as working relations, organisational structure or individual disposition. Hence, the simplest way to measure work-related stress is by asking people directly about how they feel about their jobs. Such subjective valuation measures have become widely accepted in the economic literature to date as the means for predicting and understanding individual behaviour in the labour market.[2] In this paper we will therefore, utilise a self-reported measure of perceived work-related stress where each respondent is asked to rank the level of stress he or she experiences at work.

First, to shed some light on the primary determinants of work-related stress we examine the relative importance of worker characteristics versus conditions at the working environment. Many studies have found that the sources of stress include those intrinsic to the job, one's role in an organisation, relationships with co-workers and supervisors, career development, organisational structure and climate. Others emphasise the relationship between the level of demand that individuals face within their employment and the degree of control they have over their decisions.[3] The distinction between worker characteristics and conditions at the working environment is essential when making policy recommendations. If differences in individual characteristics are more important than certain working conditions in predicting work-related stress then what may be stressful for one person may not be a problem for someone else. If on the other hand, certain working conditions are stressful to most people, then a case exists for greater emphasis on improving working conditions and for job redesign in general as the key solutions in a primary prevention strategy.

Despite the growing literature in economics on the determinants of job satisfaction, individual well being and happiness, we have identified only two studies, which have investigated work-related stress in an economics context. However both of them have treated work-related stress as an aversive or noxious characteristic of the work environment and explored the possibility that mental stress commands a compensating wage differential (Groot and Maassen van den Brink, 1999; French and Dunlap, 1998). The lack of economic studies on work-related stress may be partly due to the fact that very few nationally

[2] For an overview of subjective variables see Freeman (1978).
[3] For studies on the sources of stress in the workplace see Cooper and Marshall, 1976; Sutherland and Cooper, 1988; Syme, 1991 and Sauter & Murphy, 1995. On the relationship between the level of demand that individuals face within their employment and the degree of control they have over their decisions see Karasek, 1979, 1990.

representative datasets contain information on worker stress. The comparative advantage of this paper is that we use multi-country data from the 1997 wave of the International Social Survey Program (ISSP) to retrieve information on work-related stress, occupational factors, labour market outcomes and demographics from 15 OECD countries. The overwhelming advantage of our dataset is that it offers reliable and standardised data on stress across OECD member states. This allows us to undertake the first detailed analysis of the determinants of stress across different countries as well as examine the relationship between stress and labour market outcomes.

Hence, this paper addresses the issue of job stress in an economics context by bringing together all the relevant personal and socio-economic variables while controlling for working environment and employment conditions thought to be contributing to work-related stress. We are particularly interested in the relative importance of occupation, hours of work and workplace relations on worker episodes of stress. The medical and psychological literature has tended to focus on the problems of shift working on stress. Much less is known, however, about the effects of long hours or overtime work on stress. In Japan, the sheer magnitude of working hours[4] has been one of the suggested causes for death from overwork or "Karoshi", as it is more widely known in the literature (Nishiyama and Johnson, 1997). The European Foundation's Working Conditions Report (Merllié and Paoli, 2001) indicated that a high proportion of workers across the EU work long hours ((49% work more than 40 hours per week and 23% work more than 45 hours). Some evidence also exists that particular occupational groups are more susceptible to developing stress-related illnesses due to the nature of their job. For example, it has been established that police work is amongst the most stressful, while reports on GPs or dental assistants point to an inverse relationship between stress levels and job performance.[5]

As a second issue, this paper focuses on the labour market costs of stress by estimating the importance of work-related stress as a predictor of individuals' quitting behaviour and rate of absenteeism. Although, a number of international organisations have linked stress with absenteeism, there has been very little empirical academic research to support this relationship (and even less for the relationship between stress and quitting). The link

[4] Japan has much longer working hours than any other industrialised country. The number of male workers who work more than 3,120 hours a year, that is more than 60 hours per week on average has increased from around 3 million (15% of employed male workers) in 1975 to around 7 million (24%) in 1988 Unpaid and so-called voluntary work has also become very common (Nishiyama and Johnson, 1997).
[5] For studies on stress related illnesses in the police force see Cooper et al, 1982 and Kirkcaldy et al, 1993. Reports on stress within the NHS and UK GPs can be found in Rees, 1995 and Swanson et al, 1996. Work-related stress has also been shown to have important implications for the effectiveness and efficiency of Canadian dental assistants (Locker, 1996).

between job stress and absence from work was first suggested by Hill and Trist (1955). Frankenhaeuser and Gardell (1976) examined employees' autonomy in the workplace and showed that that workplaces characterised by low worker-control and autonomy created stress, which resulted in absenteeism. Similar results were also reported by Spector et al (1988).

If one assumes that work-related stress is an undesirable condition then the direct impact of stress on the individual may in turn have serious repercussions on the organisation of the firm through high absenteeism, high turnover costs per effective unit of labour input, industrial relations difficulties and poor quality control. However, reports of perceived levels of stress, may suffer from social desirability issues; that is, workers may be likely to indicate that they experience stress in order to signal that they are valuable members of an organisation. Alternatively, one might argue that there exists an optimal amount of stress, which is considered good, and any deviation from this optimal is undesirable. This optimal level of stress will vary by individual (Selye, 1936). In addition, work-related stress is often confused with challenge and therefore often viewed as an important ingredient for healthy and productive work. If that were the case, stress-sufferers would be those with high-responsibility high-pay jobs and better career profiles. These individuals would be upwardly mobile but one might not expect a stress-absenteeism connection, as those with demanding jobs are less likely to be absent.

Thus, if accepting that stress leads to quitting and upward mobility because the better paid jobs are the ones incurring the most stress then stress should have no effect on absenteeism. If, on the other hand, stress is a noxious characteristic of the working environment responsible for impairing employee performance it may be expected that its effect both on individual quitting decisions and absenteeism would be quite strong. It is therefore useful to consider together the effects of work-related stress on quitting and absenteeism. The paper aims to shed some light in this area by exploring in parallel the direct effects of work-related stress on individual quitting behaviour and absenteeism.

The remainder of the paper is organised as follows. Section 2 describes the data and presents some initial cross-country comparisons of work-related stress levels, quitting and absenteeism rates. Section 3 considers the factors determining stress in a pooled country model and similar-culture country groupings and investigate the relationship between stress, quitting and absenteeism. Section 4 concludes.

## 2. Data and Cross Country comparisons

### A. Work-related stress levels

Our data are taken from the 1997 wave of the International Social Survey Program (ISSP). We have selected individuals, between the ages of 18 and 65, who are not in full-time education and not self-employed from 15 OECD countries: West Germany, Great Britain, Hungary, Italy, Norway, Sweden, The Czech Republic, Canada, Japan, France, Denmark and Switzerland. This exercise provides us with a sample of 9,240 observations.

The ISSP survey asks each respondent to rank the level of stress they experience at work. A five-point ranking is used with possible responses ranging from 'always stressed' (5), 'often stressed' (4), 'sometimes stressed' (3), 'hardly ever stressed' (2) to 'never stressed' (1). We use cumulative empirical density functions to facilitate international comparisons as follows. From the individual responses we can calculate the response frequency for each stress category $i$ = 1, 2, 3, 4 and 5. We then compute, for each country, the cumulative response frequency. Thus, let $F^j(i)$ denote the fraction of respondents in country $j$ who report a stress level less than or equal to level $i$. Hence if for two countries, say $j$ and $j'$ we find that $F^j$ first-order dominates $F^{j'}$, that is if $F^{j'}(i) > F^j(i)$ for all $i$ we can say that employees in country $j$ are *unambiguously more stressed* than the workers in country $j'$.[6]

Using this definition and using the UK as reference country we plot the cumulative response function for each of the 15 countries. For presentational purposes we split the fifteen OECD countries in five groups. The first group is the Western countries group, which includes Great Britain, West Germany, Canada, France and Switzerland. The second group is that of the Eastern European countries, which includes Hungary, the Czech Republic and Poland. The third group is the Mediterranean countries, Italy, Spain and Portugal and the fourth group is the Nordic group of Sweden, Norway and Denmark. Japan stands on its own. For comparison we include the UK in each of the five country groupings. The results are presented in Figure 1.

One country's employees are unambiguously more stressed than those of another country if the first country's curve lies entirely below that of the second. Note that a flat curve with

[6] This definition exploits only the ordinal feature of the stress variable. If Fj'(i) > Fj(i) for all i, the distribution Fj(i) can be obtained from Fj'(i) through a sequence of changes in individual employees' stress-levels, all of which involve increases. Of course, the drawback is the relation "unambiguously more stressed than" is not complete.

relatively thick tails implies that that country has a relatively spread out distribution with many very stressed workers and many workers who are not stressed (see e.g. Hungary). Conversely, country whose curve is rapidly increasing in the middle region is characterised by relatively many medium stressed workers (see e.g. Norway, Switzerland, Germany and the UK). Panel F which shows all countries simultaneously reveals how strongly similar the distribution of stress is in the various countries. Some differences can however be discerned.

Overall we find that countries where the workers' self-perceived stress-levels are unambiguously higher than in the UK include Sweden, Canada and France. While more generally other countries that are characterised by relatively high levels of job stress include Japan, Portugal, Hungary, Germany and Poland. Only one country, the Czech Republic, is, by our definition, characterised by unambiguously lower stress levels than the UK. While other countries characterised by relatively low levels of work-related stress include Spain, Denmark and Switzerland. Furthermore, the general trend in the country findings remains the same when examined by gender. However, in line with the findings of a number of studies in the psychological literature, female workers are more likely to experience stress at work their male counterparts[7].

In particular, British employees appear to be the second least stressed individuals among the five Western countries presented in panel A. Their stress levels are unambiguously lower that those of French and Canadian workers. The Swiss, on the other hand appear to be those with the least work-related stress while the self-perceived stress-levels of French employees are particularly high levels with about 14 percent of them reporting to be always stressed at the workplace. Britain appears to do also well in terms of low work-related stress levels when compared to the Eastern European countries. Apart from employees in the Czech Republic where stress levels are extremely low by comparison, Polish and Hungarian workers appear to suffer from high stress levels with about 42 - 43 percent of them reporting stress to be a regular occurrence.

The Mediterranean countries are in general characterised by relatively thick-tailed distributions implying high concentration at either very low or very high levels of work-related stress. Spanish workers display some of the lowest stress levels, comparable only to those experienced by Czech workers. Levels of stress among Italian workers are comparable

[7] Our data showed that female workers, with exception of those in Britain, Italy, Canada, Spain, France Japan and Switzerland, are significantly more likely to experience stress at work than male workers. Due to lack of space the gender findings were not included but are available from the authors on request.

to those of their British counterparts while the fraction of Portuguese workers reporting to be "always stressed" at nearly 17 percent is the highest in the sample. Swedish employees on the other hand are unambiguously more stressed than their Danish and Norwegian counterparts as well as the British while the Danish stress levels are unambiguously the lowest in that group, with only 4 percent reporting being "always stressed" at work. This stands in clear contrast to the findings regarding the Japanese workers, who, not surprisingly perhaps, dominate the high stress results of the sample alongside Portugal. Both countries report "some stress" level at 41 percent and regular stress occurrences between 39 and 41 percent.

B. Stress, Quitting Behaviour and Absenteeism

Despite the existence of a large literature on job turnover, studies examining the relationship between job characteristics and quitting behaviour in economics are extremely rare - one reason for this being the lack of large sample longitudinal data that can be used to identify both job characteristics at wave t-1 and job turnover between waves t-1 and t. The handful of studies that have investigated this relationship (see for example, Freeman, 1978 and Akerlof et al., 1988) robustly establish that the causality runs from unhappiness on the job to quitting outcomes. In the absence of appropriate panel data, however, the use of data on quitting intentions allows the investigation of the relationship between stress and quitting behaviour within cross sectional data. An important question which we therefore need to address is 'how good a predictor of actual quitting is intended quitting'? A number of previous studies in the psychological literature have found quitting intentions to be the strongest predictor of actual turnover. Within the economics literature, Mercer (1979), for example, found that 79% of workers reporting an intention to quit had done so within the following year. Shields and Ward (2001) find that while 39% of nurses report intentions to quit in the next three years, 36% are found to have left NHS nursing three years later.

To explore the relationship between stress and quitting behaviour, we follow the approach of Laband and Lentz (1998), Gordon and Denisi (1995) and Ward and Shields (2001) by using the responses to a question asking participants about their future employment intentions (i.e. latent turnover): 'How likely is it that you will try to find a job with another firm or organisation within the next 12 months?'. Of the four possible responses to our question, we therefore define a 'quitter' as an individual who indicates that they are very likely or likely to

try to find another job within the next 12 months. A 'stayer' is defined as an individual who indicates that they are unlikely or very unlikely to do so.

Figure 2 shows the percentage of individuals with quitting intentions by stress level. For presentational purposes we collapse the five values of the stress variable into two categories, one category describing the "never stressed", "almost never stressed" and "sometimes stressed" levels and the other representing the "often stressed" and "always stressed" levels. The overall results vary greatly by country. Quitting intentions may vary across the countries depending on labour market institutions. Interestingly, looking at the gross figures across countries in Figure 2 and comparing the above findings with those of Figure 1 we can see that countries with high job stress levels, such as Japan or Hungary, tend on average to have low percentages of employees with quitting intentions. While on the other hand, countries with relatively low job stress levels such as the Czech Republic, Spain, Denmark or Britain display high percentages of individual quitting intentions. However, the focus of this paper is on whether rising levels of work-related stress may indeed increase individual quitting intentions. Hence for our purposes we need to look closer at the relationship between work-related stress and intentions to quit within countries.

Figure 2 displays a very strong positive relationship between stress levels and quitting intentions. It is quite obvious that in all bar two countries, Poland and Canada, the percentage of individuals with intentions to search for another job in the next 12 months is increasing with job stress level. The percentage of highly stressed individuals who have intentions to quit their jobs in all remaining thirteen countries is between 2 and 15 percent higher than that of their counterparts with almost non-existent job stress levels. In fact employees with high stress levels in countries with low on average levels of work related stress, such as Spain or Switzerland, seem to display the most pronounced differences in quitting intentions by stress level, ranging between 12 and 15 percentage points.

Given the above findings if one were to pursue the argument that work-related stress is an undesirable condition and not a necessary ingredient for enhancing individual productivity then work-related stress might also be associated with high levels of absenteeism. To describe such possible correlations between work-related stress levels and absenteeism we used information available on the number of days respondents were absent from work within the 6-month period prior to the interview. As with most absenteeism data, we have no information on reasons for absence and in particular no information on absence due to illness.

Historically different time periods have been used to measure absenteeism per unit of time. Chadwick-Jones *et al* (1982) proposed that one-day absences are usually voluntary and could represent an "unauthorised vacation" (Staw and Oldham, 1978). Lengthier absences, on the other hand, may be perceived as involuntary or unavoidable absences, possibly due to illnesses. Since illness may be the outcome of stress, the lack of this information provides less of a problem here than for other studies of absenteeism. In fact measures that give equal weight to all absences regardless of length, may be the most effective measure of stress research.

Figure 3 reports the percentage of respondents absent from work for one or more days by stress level, using once more two stress level categories as above. Here as in Figure 2 the results vary widely by country. When absences across countries are compared with overall stress levels across countries from Figure 1 the signals are somewhat mixed. In particular, some high work-related stress level countries, such as Japan, Canada, Portugal and Sweden display high levels of absenteeism, while other high stress countries such as Hungary, Poland and France display relatively low levels of absenteeism. On the other hand, countries with relatively low levels of stress, such as Britain, Denmark, Switzerland, the Czech Republic and Germany report high levels of absenteeism.

These are indeed gross country comparisons and many factors, such as generous benefit systems or differing levels of labour market flexibility, can explain these differences in the absenteeism patterns. However, once more here we are interesting in establishing any pattern that may exist between rising stress levels on absenteeism behaviour. Figure 3 displays a positive relationship between stress levels and absenteeism in the majority of the countries in our sample. What is more, as in the case of Figure 2, the percentage of highly stressed individuals who report being absent from work in the last six months is between 4 and 15 percent higher than that of their counterparts with almost non-existent levels of stress. Two more interesting patterns also emerge.

First, countries whose employees quitting intentions increase with reported work-related stress levels also display high levels of absenteeism. In particular, countries, such as Britain, Germany, Norway, Denmark and Switzerland, that have some of the largest percentage differences among quitting intentions by stress level, also report high levels of absenteeism and large differences among absenteeism by stress level. Second, even in high stress level countries where individual quitting intentions appear to be relatively low, such as Hungary

and Japan, absenteeism levels are remarkably high (Japan) or display very pronounced correlations with stress level (Hungary). In both these cases it may be safe to assume that given the inflexibility of the labour market, individuals with high levels of work-related stress are more likely to be absent than quit their jobs.

The above findings clearly display strong positive relations between job stress levels quitting intentions and absenteeism. However these findings are merely descriptive correlations because they fail to control for labour market conditions, cultural differences and occupational and personal characteristics. Our next step therefore is to shed more light in the above relationships while controlling for country and individual differences.

## 3. The determinants of work-related stress, quitting intentions and absenteeism

### A. The determinants of work-related stress

This section turns to the detailed investigation of the determinants of stress. Our self-reported measure of work-related stress is taken to represent a direct proxy for the utility "penalty" from work. Given the ordinal nature of the stress variable we therefore estimate an ordered probit model to determine the level of stress reported by individuals in terms of a latent variable ($s^*$) and the observed stress level ($s$) as follows:

$$s^* = \beta_1' Y + \beta_2' H + \beta_3' IND + \beta_4' JOB + \beta_5' PHH + \beta_6' PSH + \upsilon \qquad (1)$$

$$s = h \text{ if } T_{h-1} < s^* < T_h \qquad h = I,...,H-I \qquad \upsilon \sim \mathrm{N}(0,1)$$

where $Y$ is the absolute wage, $H$ is the number of hours worked, *IND* are individual characteristics, *JOB* are job-related characteristics, PSH represents physical hazards (for example hard work and danger) and PHH represents psychological hazards (aspects of work design, organisation and management of work) of the job. $\beta_i \ (i = 1...6)$ are vectors of parameters and $h$ denotes the level of stress. We code $s$ as: (1) never stressed, (2) hardly ever stressed, (3) sometimes stressed, (4) often stressed and (5) always stressed. Equation (1) then describes the individual's unobserved propensity for stress (utility penalty from work), $s^*$, given the six vectors of exogenous variables. The thresholds ($T_0$ to $T_{h-1}$) provide the values of $s^*$ required for a given level of stress to be experienced, with a value of $s^* < T_0$ placing an individual at the lowest stress level. As $s^*$ increases one or more thresholds are

crossed and the individual's stress increases. The model is estimated by maximum likelihood and identification is achieved by setting $T_0 = 0$ (See Davidson and MacKinnon, 1993, for further details).

We estimate two versions of this model. A basic model where we restrict the elements in vectors $\beta_5$ and $\beta_6$ to be zero and an extended model where we include 9 subjective physical and psychological job characteristics describing: a dangerous, hard physical, exhausting, interesting, useful-to-society, independent or dedicated-to-helping-others job and good relations with colleagues or management at work. The first two columns in Table 1 present the results for both regressions. We present marginal effects, rather than coefficients, in order to enable the direct comparison of the magnitude of the variables in our model. Note however, that we use Principal Component Analysis, in order to summarise vectors $\beta_5$ and $\beta_6$ in a meaningful way.

The objective of Principal Component Analysis is to find the unit-length linear combinations of these variables with the greatest variance i.e. identifying underlying factors that contain most of the information contained in the nine variables (see Lawley and Maxwell, 1971 for further details). Following standard practice we retained only those components (out of the nine) that have eigenvalues greater than 1, regarding the others as sampling noise in the data. The practical benefit of this procedure is that the extracted components can be included as orthogonal covariates in our model, as opposed to including nine separate variables, which are likely to be highly correlated.

The results[8] suggest that there are common dimensions in the subjective job characteristic measures. Three components were retained in the analysis, and the proportion of the variance in the data explained by them (the so called 'communality') is consistently above 70%. Examining the aspects of the job that load most heavily onto each of the components enables us to gain an idea as to what 'unobservable' characteristic each represents. Three job aspects loaded most heavily onto the first component: having an interesting job, a job where you work independently and a job that helps society. We term this component the "non-pecuniary advantages of the job". The second component is dominated by hard work and danger. We term this new component "physical demands of the job". Component three is dominated by communication with management and with colleagues. We refer to this component as "workplace relations". Using the resulting loading factors and the individual specific

responses to the nine job characteristic questions we construct, for each individual, three "composite" variables that we include as explanatory variables in our model.

Column 1 in Table 1 shows that for our pooled 15-country sample we find evidence of significant variation in reported stress levels across OECD member countries confirming our descriptive statistics in section 2. The findings here place Britain in a middle work-related stress ranking among the 15 OECD countries where the French, Polish, Swedish and Portuguese workers are by comparison to their British counterparts the most stressed while the Czechs, Danish and Swiss are the least stressed. The results also indicate a significant difference in reported stress by gender. Female employees are likely to report higher stress levels than their male counterparts[9]. This result is consistent with the psychological literature, which reveals that females experience significantly greater stress than men at the workplace[10]. In addition, work-related stress is significantly increasing with education, skills and income level, which implies that stress may be positively associated with job responsibility. Longs working hours also have a strong positive and significant effect on job stress levels. Those working between 20 and 40 hours a week are 10 percent more likely to experience work-related stress than those working less than 20 hours; for those working more than 40 hours a week the corresponding figure is 45 percent.

The introduction of our subjective physical and psychological job characteristics in the model generate some interesting findings but does not change our general findings (column 2, Table 1). Good working relations with colleagues and or management and non-pecuniary advantages, such as an interesting, independent or useful to society job have a significantly negative, effect on stress experienced at work. Physical demands of the job, such as danger, or hard work, on the other hand, play the largest role in aggravating job stress levels.

In an attempt to disentangle to what extent variations in experienced stress levels across countries might be due to cultural differences in the interpretation of response to questions concerning stress we re-run our extended model, grouping together countries of broadly

[8] Available from the authors on request.

[9] Separate regressions for both the basic and extended model were run for men and women and the results are available from the authors on request. We find that that the impact of long working hours on the probability of experiencing stress is much larger for female relative to male workers. Moreover, stress is significantly positively increasing with income for females and with marriage or cohabitation for men, while the effect of age on work-related stress has a significantly positive effect only for women. In our extended model the subjective physical and psychological job characteristics appear to have a stronger effect on work-related stress for women than for men with workplace relations having the strongest positive impact on job stress for women. The results on our other explanatory variables remain on the whole unchanged.

[10] Several explanations have been offered for this finding – that women still play a predominant role in the provision of family care, that they face lower levels of control in their jobs – since they are most likely to occupy less senior positions, the proliferation of women in high stress occupations such as teaching, nursing, prejudice and discrimination suffered by many women on the job or the higher proportion of women that work in precarious forms of employment.

European countries, Mediterranean countries, Nordic countries and Japan. We find that the overall results for each group of countries remain largely unaffected although significant variations in reported stress by country persist. However certain variations exist in the magnitude and influence of our explanatory variables between country groups.

The results show that stress is significantly increasing with working hours for all country groups although the impact of long working hours on the probability of experiencing stress at work is more pronounced for the Western and Mediterranean countries and, perhaps less surprising, for Japan. Moreover, stress is significantly positively increasing with income for Western European and Japanese workers. Hence it would seem for these groups particularly that relatively better jobs incur more stress although this effect is relatively small in magnitude. We find significant evidence that experienced stress levels vary by occupation. Professional and skilled technicians are significantly more prone to stress at the work, and those working in agriculture significantly less prone, in comparison with unskilled workers. Work-related stress is also found to be significantly influenced by a number of other characteristics: increasing with educational level for all country groups, barring the Western countries, when managing people, with the exception of Japan, and being a trade union member. The negative effect of public sector employment on work-related stress is mainly pronounced in the Mediterranean countries reflecting the particularly large size of public sector employment in those countries and highlighting the effect of job security which is associated with this type of employment contracts. The overall effect of the subjective physical and psychological job characteristics included in our model is strong and significant in all country groupings although its magnitude is the largest for Japanese workers.

B. Work related stress as a determinant of quitting behaviour

Having investigated the determinants of work-related stress, we continue by estimating an intention-to-quit equation based on standard demographic and job-specific variables, including country and occupation dummies. In addition, we include controls for job stress as three dummy variables indicating always stressed, often stressed and some stress (with never stressed acting as the reference category).

$$P(Quit) = f(\text{demographic variables, job-specific variables, stress}) \qquad (2)$$

Considering the dichotomous nature of our quitting variable (i.e. STAYER = 0, QUITTER = 1) we estimate a binary probit model in order to calculate the probability of individuals intending to leave their current job in the 12 months following the interview. We assume that intentions to quit are a function of stress or utility penalty from work and vectors of individual and work-related characteristics, which aim to capture the labour and non-labour market opportunities available to individuals outside their current job. The vector of individual characteristics, which we include as covariates in our model, are age, gender, education, marital status, each of which are expected to be important in determining the number of labour and non-labour market opportunities available to individuals outside of their current job. In particular, we expect that younger respondents will have a greater number of labour market openings available to them, and that females would have more non-labour market opportunities than males. Similarly, the more highly educated are likely to have greater occupational mobility than the less educated. Finally, in order to capture as much variation in intentions to quit as possible, we also include a number of job-related characteristics, which may be important in determining the outside opportunities available to workers. We include controls for income, hours worked, whether or not a worker is a supervisor, public sector worker, or trade union member.[11]

Table 2 presents the results for our intentions to quit model for the full sample and for males and females separately. Variation in quitting intentions by country may pick up both variations in the flexibility of labour and local labour market conditions across country. Similarly results may be influenced by the social acceptability of quitting in these countries. Consistent with earlier work, our model predicts turnover to be greatest for male workers, the more highly educated and for those under the age of twenty-five. The relationship between age and intention to quit is linear with older workers being significantly less likely to report an intention to quit over the next 12 months than those less than 25 years of age. Similarly high-income earners are more likely to voice quitting intentions, but being married has a significantly negative effect on intentions to quit. These latter effects are strongest for females.

[11] So far, we have assumed that the error terms of the stress and intentions to quit model are not significantly correlated i.e. there is no unobservable individual heterogeneity which simultaneously determines stress and intentions to quit. To provide a simple test of the robustness of our findings to possible endogeneity concerns we simultaneously estimate job stress and intentions to quit using a bivariate probit framework. Since this model requires two binary outcomes, we collapse our ordered stress measure into a stressed variable that takes the value 1 if an individual reports stress on the job, and 0 otherwise. Results of this exercise using the six dummy variables for occupation (which are all insignificant in the quitting regression) we find evidence of some correlation in the residuals terms (at the 5% level of significance) but allowing for this does not significantly affect our estimates of the impact of stress on intentions to quit provided below. For brevity the results from these additional models are not presented, but they are available from the authors on request. A similar conclusion is supported by Clark et al. (1999), who find that the relationship between job satisfaction and quitting, identified in cross-sectional studies, is robust to concerns about unobserved individual heterogeneity.

The three work-related stress dummy variables, which provide a direct estimate of the impact of stress on quitting intentions, reveal job stress to be an important determinant of intentions to quit. Those individuals reporting to experience at high levels of stress in their current position are 14 percent more likely to hold intentions to quit than those without, with the probability of intending to quit increasing with successively higher job stress. In addition, stress as a determinant of job turnover is found to be more important for females than males. Female workers reporting to experience high levels of some stress in their current job are 16 percent more likely to hold intentions to quit than those without; for men the corresponding figure is only 12.

A number of other job characteristics are also found to be significant in our analysis of quitting intentions. A preference for long working hours exists for male employees while the opposite is true for their female counterparts. Men working less than 50 hours a week are less likely to have intentions to quit their current job whereas such intentions are more likely to develop for women working longer than a 60-hour week. Those working in the public sector or trade union members have a significantly lower probability of intending to quit. However, no significant variation in quitting behaviour has been found across broad occupational groups.

These results confirm the importance of stress in determining individual's quitting intentions, and also highlight particular groups of workers for whom outside opportunities are greatest. These are specifically the youngest workers, the highest earners and those without family obligations. For a number of groups and occupations within an economy, the natural turnover of workers is beneficial to growth and development. Indeed stress may be symptomatic of a bad match between job and worker. Within particularly 'high stress' occupations however, with groups of workers frequently exposed to job stress and as a consequence which tent to suffer from high rates of turnover, active policy towards stress management may be beneficial.

C. Work related stress as a determinant of absenteeism

This section attempts to expand the limited empirical evidence on the relationship between stress and worker absenteeism. For this investigation we again estimate a binary probit model, with the dependent variable taking the value of 1 if an individual was absent from work in the 6 month period prior to interview and taking the value of 0 otherwise. We assume

that absence is a function of stress or utility penalty from work and the same vectors of individual and work-related characteristics as used in the previous section's analysis, controlling for job stress as a series of dummy variables indicating always stressed, often stressed and some stress[12].

Table 3 presents the estimates of our absenteeism model, for the full sample and for males and females separately. Consistent with earlier work, our model predicts males are significantly less likely to be absent from work. Although such a finding may be somewhat difficult to interpret in terms of the standard income-leisure model of labour supply, it may be that women play a larger role in household production and hence may be absent from work in order to gain more flexibility to perform their domestic duties. Studies of absenteeism have reached various conclusions on that issue but the overwhelming majority seems to support our findings (see for example Brown and Sessions, 1996). The likelihood of being absent from work also significantly decreases with age and educational level - although the latter is only significant for males. Papers using age as a proxy for unmeasured health status, stage of career, or attitudes towards work support this result (see for example Allen, 1981 and Leigh, 1991 and Vistness Primofff, 1997).

Just in the case of individual quitting intentions however, the dummy variables on job stress reveal job stress to be the most important determinant of absenteeism. Those individuals reporting to experience high levels of some stress in their current position are 10 % more likely to have taken periods of absence from work than those without, the probability increasing with successively higher job stress. Again, we find that the effect of stress on labour market outcomes is stronger for female workers. Female workers reporting to experience high stress levels in their current job are 13 percent more likely to hold intentions to quit than those without; for men the corresponding figure is only 7.

A number of other job characteristics are also significant in the determination of absence from work. Although the number of hours worked is on the whole insignificant in the determination of absenteeism rates for men, for women those employed for 31 to 40 hours a week are more likely to be absent than those who are employed for 30 hours or less. Given that 30 hours of work is widely accepted as the threshold for part-time employment one may

[12] To provide again a simple test of the robustness of our findings to possible endogeneity concerns we simultaneously estimate job stress and absenteeism using a bivariate probit framework Results of this exercise using our three dummy variables for education (which are all insignificant in the absence regression) we find evidence of no correlation in the residuals terms. For brevity the results from these additional models are not presented, but they are available from the authors on request.

flexibility their work schedule (Chaudhury and Ng, 1992). Trade union members and public sector workers, are significantly more likely to be absent from work. Allen (1984) and (Chaudhury and Ng, 1992) found that unionisation increases absenteeism because it insulates workers against dismissal. The job security of public sector employment may explain our findings along the same lines. The effect of being a boss on absenteeism is significantly negative for women.

The likelihood of being absent varies by occupational group – unskilled workers are significantly more likely to be absent from work. We find some variation in the probability of absence by country. The Canadian and Japanese are significantly more likely than the British to be absent from work. Our analysis therefore highlights those workers most at risk from absenteeism as female workers, the young, the lower skilled, public sector and trade union members.

## 4. Conclusions

The aim of this paper has been twofold; to investigate in detail the determinants of stress in today's working environment and estimate the importance of work-related stress as a predictor of individuals' quitting behaviour and the rate of absenteeism. Using a self-reported measure of perceived work-related stress and data on 15 OECD countries from the International Social Survey Program, our analysis reveals some significant findings.

We have found that British employees can be placed in a middle work-related stress ranking among the 15 OECD countries, with the French, Canadians and Swedish workers being by comparison unambiguously the most stressed and the Czechs, Danish and Swiss being the least stressed. Britain fares well in terms of low job stress not only among the Western countries but also when compared to some of the Eastern European countries such as Poland and Hungary whose workers report stress to be a regular occurrence. Other countries that are characterised by relatively high levels of job stress include, Japan, Portugal, Hungary, Germany and Poland.

To shed some light on the primary determinants of work-related stress we examine the relative importance of worker characteristics versus conditions at the working environment. Our results do not reveal an unambiguous dominance of the latter over the former. They do however indicate that certain physical and psychological job characteristics such as working

hours, physical demands of the job, non-pecuniary advantages of the job, and working relations have an important role to play in determining work-related stress. Females report higher stress levels than men. Stress is significantly increasing with working hours – for all country groups and for both men and women. Stress is also significantly positively increasing with income while significant evidence exists that experienced stress levels vary by occupation. Job stress is found to be significantly increasing with educational level, when married, when managing people, being a trade union member, but decreasing for public sector workers.

The second step of our investigation focuses on the effect of stress on labour market outcomes. We first investigate the relationship between stress and respondent's intentions to quit their job in the next 12 months. Workers for whom outside opportunities are greatest include the youngest workers, the most highly educated and those without family obligations. Results of this analysis reveal job stress to be a very important determinant of intentions to quit. Those individuals reporting to experience at least some stress in their current position are 25 percent more likely to hold intentions to quit than those without, with the probability of intending to quit increasing with successively higher job stress.

Second we move on to the examination of the relationship between job stress and a respondent's probability of being absent. Our analysis reveals workers most at risk from absenteeism are female workers, the lower skilled, lower educated and trade union members. However again, those individuals reporting to experience at least some stress in their current position are also overall 25 percent more likely to have taken periods of absence from work than those without. Those individuals reporting to experience at least some stress in their current position are 8% more likely to be absent than those with no stress at all, the probability increasing with successively higher job stress, reaching 13% for those reporting being always stressed at work.

Work-related stress is a current and future health and safety issue. The emerging evidence from this paper supports the hypothesis that stress is a serious noxious characteristic of the working environment impairing employee performance through turnover and absenteeism. It should therefore be dealt with in the same logical and systematic way as any other labour market issue. Existing data, however, prevent the research on work-related stress from following a longitudinal approach to the subject controlling for the dynamic characteristics in an individual's life and exploring to what extent job stress might be responsible for an

individual's career path. If workers frequently exposed to job stress are associated with high turnover rates and absenteeism further research on the subject would allow for active stress management policies to be more beneficial for the individual and the economy as a whole.

**Bibliography**


Akerlof, G. A., Rose, A. K. and Yellen, J. Y., (1988) Job Switching and Job Satisfaction in the US, ***Labor Market Brookings Papers on Economic Activity***, 2, pp. 495-582.

Allen, S. G., (1981) An Empirical Model of Work Attendance, ***Review of Economic Studies***, 63, 1, pp. 77-87.

Allen, S. G., (1984) Trade Unions, Absenteeism and Exit Voice, ***Industrial and Labour Relations Review***, 37, 3, pp. 331-345.

Brown, S. and Sessions, J. G., (1996) The Economics of Absence: Theory and Evidence, ***Journal of Economic Surveys***, 10, 1, pp. 23-31.

Chaudhury, M. and Ng, I., (1992) Absenteeism Predictors: Least Squares, Rank Regression, and Model Selection Results, ***Canadian Journal of Economics***, 3, pp. 615-634.

Chadwick-Jones, J. K., Nicholson, N. and Brown, C., (1982) ***Social Psychology of Absenteeism***, Praeger, New York.

Clark, A., Georgellis, Y. and Sanfey, P., (1999) Job Satisfaction, Wage Changes and quits: Evidence from Germany, ***Research in Labor Economics***, 17, pp. 95-121.

Cooper, C. L. and Marshall, J., (1976) Occupational Sources of Stress: A Review of the Literature Relating to Coronary Heart Disease and Mental Ill-Health, ***Journal of Occupational Psychology***, 49, pp. 11-28.

Cooper, C. L., Davidson, M. J. and Robinson, P., (1982) Stress in the Police Service, ***Journal of Occupational Medicine***, 24, 1, pp. 30-36.

Davidson, R. and MacKinnon, J. G., (1993) ***Estimation and Inference in Econometrics***, Oxford University Press.

Frankenhaueuser, M. and Gardell, B., (1976) Underload and Overload in Working Life: Outline of a Multidisciplinary Approach, ***Journal of Human Stress***, 7, pp. 129-170.

Freeman, R. B., (1978) Job Satisfaction as an Economic Variable ***American Economic Review***, 68, pp. 135-141

French, M. T. and Dunlap, L., (1998) Compensating Wage Differentials for job stress, ***Applied Economics***, 30, pp. 1067-1075.

Gordon, M. and Denisi, A. (1995) A Re-examination of the Relationship Between Union Membership and Job Satisfaction, ***Industrial and Labor Relations Review***, 48, pp. 222-236.

Groot, W. and Maassen van den Brink, H., (1999) The Price of Stress, ***Journal of Economic Psychology***, 20, pp.83-103.

Health and safety executive, (1990b) Mental Health at Work, HSE Books, Sudbury.

Hill, J. M., and Trist, E. L. (1955) A Consideration of Industrial Accidents as Means of Withdrawal from the Work Situation, ***Human Relations***, 8, pp. 121-152.

Karasek, R. (1979) Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign, ***Administrative Science Quarterly***, 24, pp. 285-309.

Karasek, R. and Theorell, T., (1990) ***Healthy Work: Stress, Productivity, and the Reconstruction of Working Life***. New York: Basic Books.

Kikcaldy, B. D., Cooper, C. L. and Furnham, A., (1993) Police Personality, Job Satisfaction and Health, ***Studia Psychologica***, 36, 1, pp. 55-64.

Laband, D. and Lentz, B., (1998) The effects of Sexual Harassment on Job Satisfaction,

Earnings and Turnover among Female Lawyers, ***Industrial and Labor Relations Review***, 51, pp. 594-607.

Lawley, D. N. and Maxwell, A. E., (1971) ***Factor Analysis as a Statistical Method***, 2nd edition, Butterworths, London.

Leigh, J. P. (1991), Employee and Job Attributes as Predictors of Absenteeism in a National Sample of Workers: The Importance of Health and Dangerous Working Conditions, ***Social Science and Medicine***, 33, 2, pp. 127-137.

Locker, D., (1996) Work Stress, Job Satisfaction and Emotional Well-Being Among Canadian Dental Assistants, ***Community Dentistry and Oral Epidemiology***, 24, 2, pp. 133-137.

MacFadyen, A. J., MacFadyen, H. W. and Prince, N. J., (1996) Economic Stress and Psychological Well-being: An Economic Psychology Framework, ***Journal of economic psychology***, 17, 3, pp.291- 312.

Mercer, G., (1979) ***The Employment of Nurses: Nursing Labour Turnover in the NHS***, Croom Helm, London.

Merllié, D. and Paoli, P., (2001) Ten Years of Working Conditions in the European Union, **European Foundation for the Improvemnet of Living and Working Conditions.**

Nishiyama, K. and Johnson, V. J., (1997) Karoshi - Death from Overwork: Occupational health consequences of the Japanese production management, ***mimeo, Department of Health and Policy Management, John Hopkins University.***

Porter, L. W. and Steers, R. M., (1973) Organisational, Work and Personal Factors in Employee Turnover and Absenteeism, ***Psychological Bulletin***, 80, pp. 151-176.

Quick, J. C., Quick, J. D. and Nelson, D. (1990) **Stress and Challenge at the Top**, Wiley, New York.

Rees, D. W., (1995) Work-related Stress in Health Service Employees, ***Journal of Managerial Psychology***, 10, pp. 4-11.

Sauter, S. L. and Murphy, L. R., (1995), The Changing Face of Work and Stress, In S. L. Sauter and L. R. Murphy (Eds.), ***Organizational Risk Factors for Job Stress***, Washington, DC: American Psychological Association.

Selye, H. (1976) **Stress in Health and Disease**, Butterworths, Boston.

Shields, M. A. and Ward, M. E., (2001) Improving Nurse Retention in the National Health Service in England: The impact of Job Satisfaction on Intentions to Quit, ***Journal of Health Economics***, 20, 5, pp. 677-70.

Spector, P. E., Dwyer, D. J. and Jex, S. M., (1988) Relation of Job Stressors to Affective, Health and Performance Outcomes: A Comparison of Multiple Data Sources, ***Journal of Applied Psychology***, 73, 1, pp. 11-19.

Staw, B. M. and Oldham, G. R., (1978) Reconsidering our Dependent Variables: A Critique and Empirical Study, ***Academy of Management Journal***, 21, pp. 539-559.

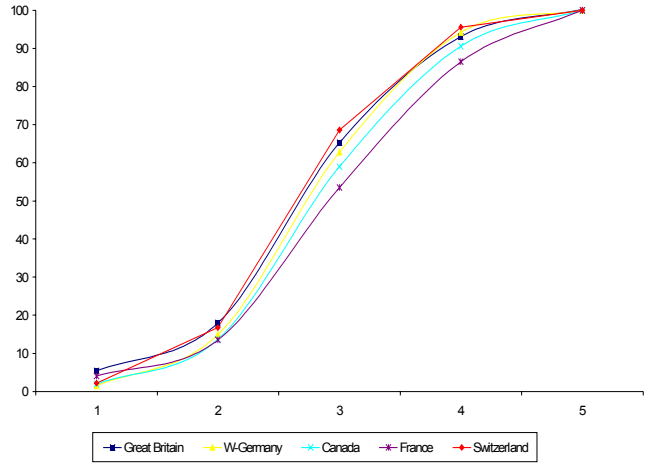
Sutherland, V. J. and Cooper, C. L., (1988) Sources of Work Stress In J. Hurrell, Jr., L. R. Murphy, S. L. Sauter, and C. L. Cooper (Eds.), ***Occupational Stress: Issues and Developments in Research***, New York: Taylor and Francis.

Swanson, V., Power, K. and Simpson, R., (1996) A comparison of Stress and Job satisfaction in Female and Male GPs and Consultants, ***Stress Medicine***, 12, pp. 17-26.

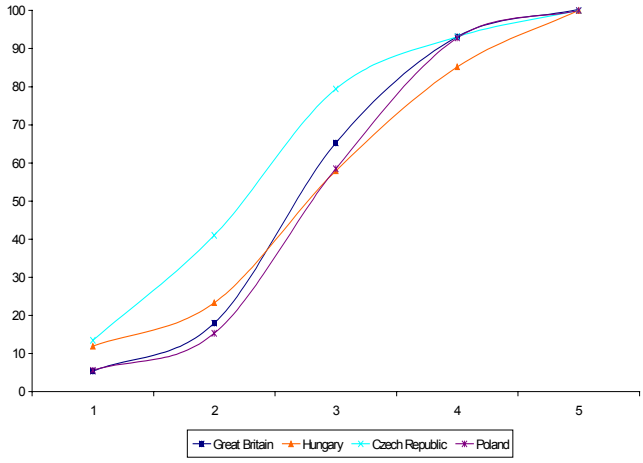
Syme, S. L., (1991) Social Epidemiology and Work Environment, In J. Johnson and G. Johansson (eds.), ***The Psychosocial Work Environment : Work Organisation, Democratization and Health***, Amityville, NY: Baywood.

Vistness Primoff, J., (1997) Gender Differences in Days Lost from Work Due to Illness, ***Industrial and Labor Relations Review***, 50, 2, pp. 304-321.

Figures 1: Cumulative Stress Distributions by Country Groupings




A. Great Britain and other Western Countries

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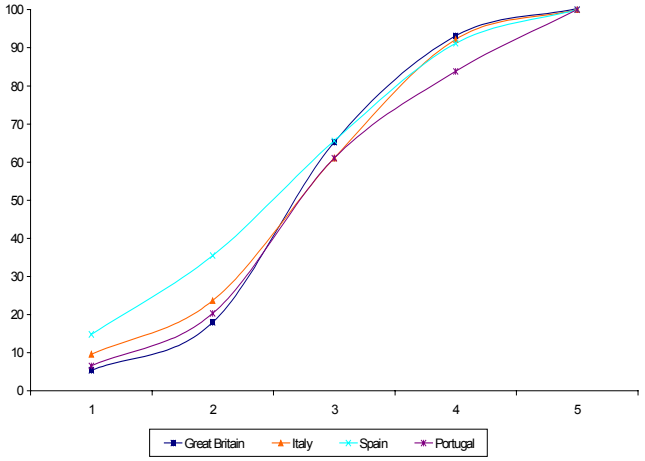
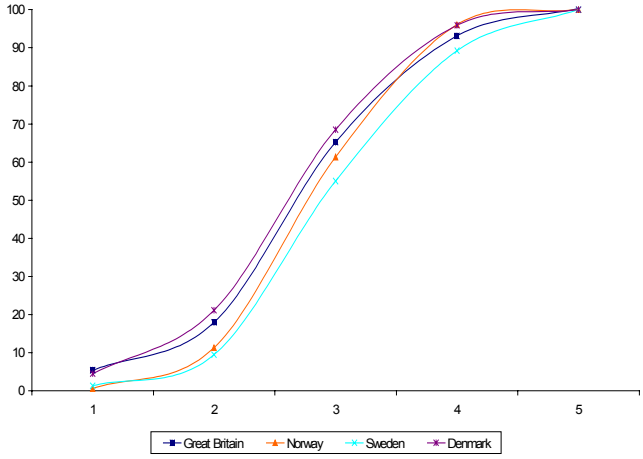
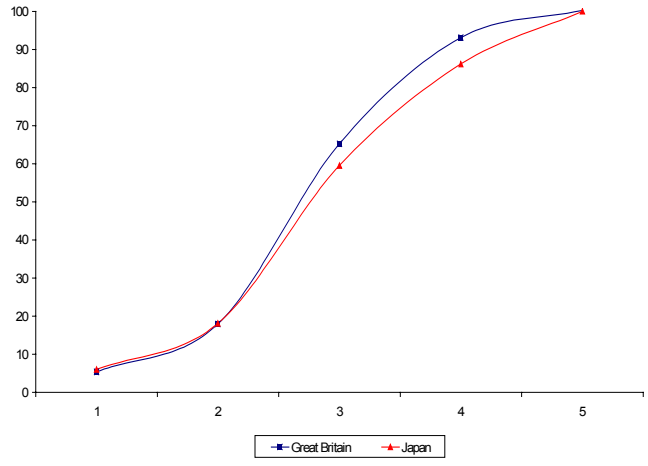


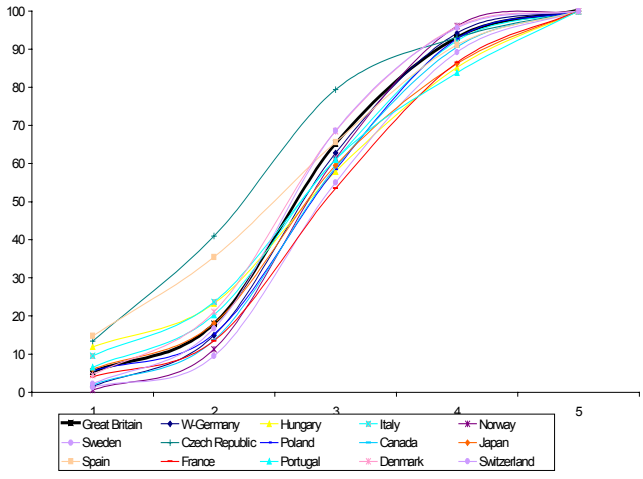

C. Great Britain and Mediterranean Countries




D. Great Britain and Nordic Countries




E. Great Britain and Japan




F. All Countries

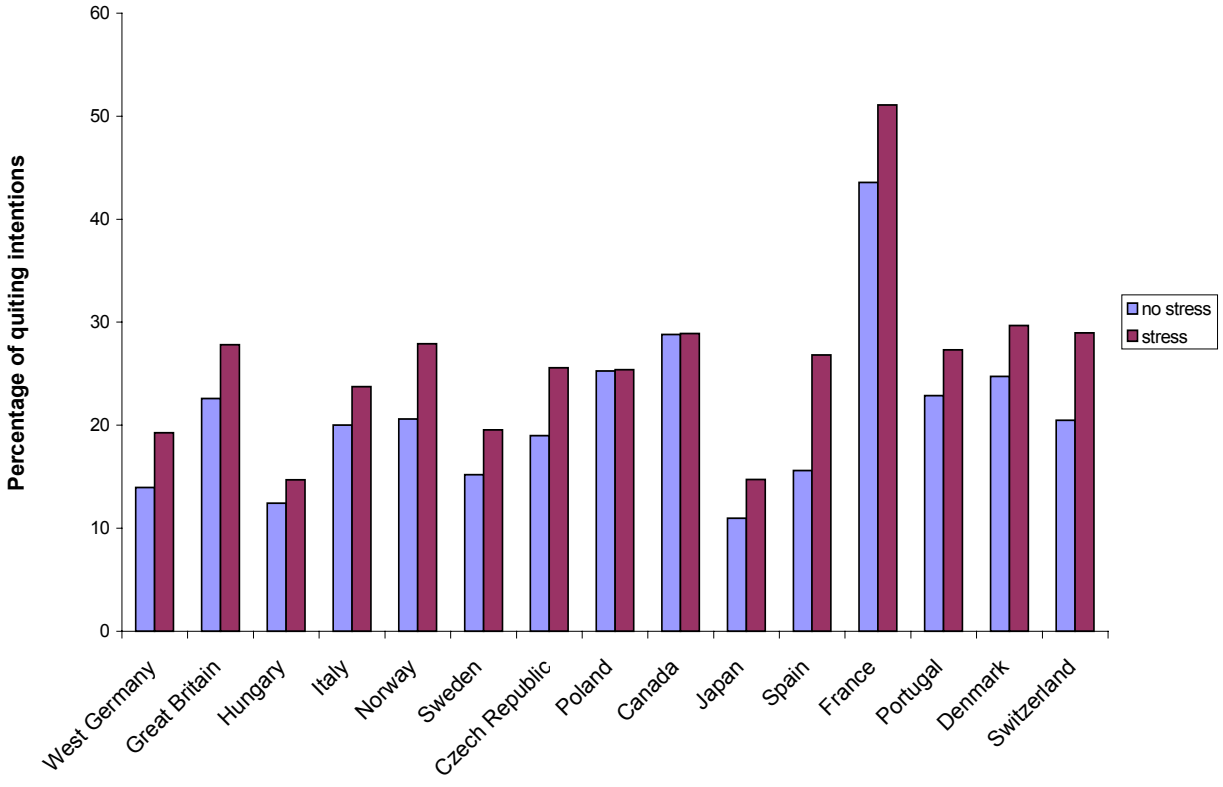



Figure 2. Correlations between stress and quitting intentions

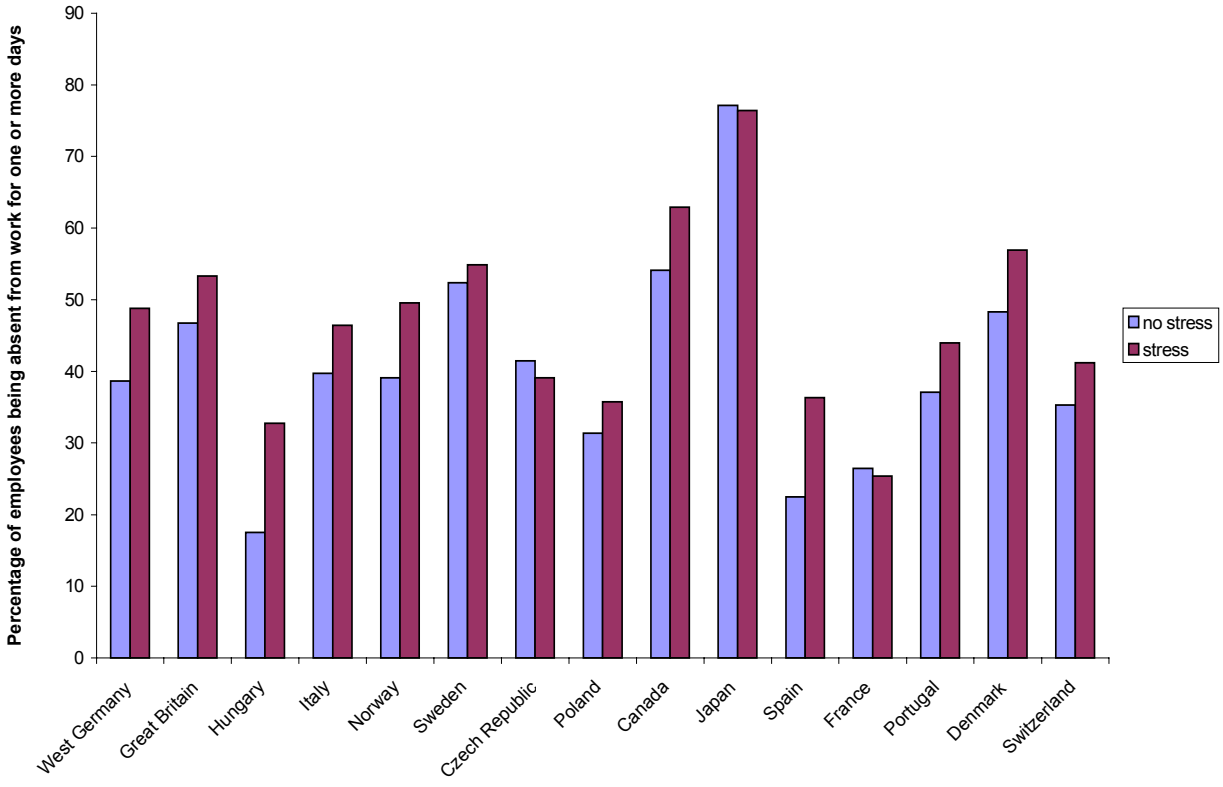



Figure 3. Correlations between stress and absenteeism

**Table 1: Ordered probits : The determinants of work-related stress (Standard errors significance: *=10% **=5% ***=1%)**

| | All | | | | | | Western countries | | | Eastern European countries | | | Mediterranean countries | | | Nordic countries | | | Japan | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Variable* | *dY/dx* | | *Std. Err.* | *dY/dx* | | *Std. Err.* | *dY/dx* | | *Std. Err.* | *dY/dx* | | *Std. Err.* | *dY/dx* | | *Std. Err.* | *dY/dx* | | *Std. Err.* | *dY/dx* | | *Std. Err.* |
| ***Age*** | | | | | | | | | | | | | | | | | | | | | |
| *Age 25 - 34* | 0,020 | *** | 0,008 | 0.018 | *** | 0.007 | 0.019 | | 0.012 | 0.014 | | 0.017 | 0.036 | ** | 0.019 | -0.015 | | 0.010 | 0.086 | * | 0.046 |
| *Age 35 - 44* | 0.015 | ** | 0.008 | 0.015 | *** | 0.008 | 0.022 | * | 0.012 | 0.008 | | 0.016 | 0.023 | | 0.021 | -0.018 | * | 0.010 | 0.098 | ** | 0.051 |
| *Age 45 - 54* | 0.008 | | 0.008 | 0.012 | | 0.008 | 0.020 | | 0.013 | 0.015 | | 0.017 | 0.012 | | 0.022 | -0.016 | | 0.010 | 0.039 | | 0.047 |
| *Age 55 - 65* | 0.005 | | 0.009 | 0.013 | | 0.009 | 0.015 | | 0.015 | -0.007 | | 0.020 | 0.041 | | 0.028 | -0.021 | *** | 0.010 | 0.086 | | 0.062 |
| ***Education*** | | | | | | | | | | | | | | | | | | | | | |
| *Secondary school* | 0.014 | *** | 0.006 | 0.019 | *** | 0.006 | -0.001 | | 0.009 | 0.023 | ** | 0.013 | 0.026 | *** | 0.013 | 0.013 | * | 0.007 | 0.082 | *** | 0.033 |
| *University* | 0.016 | ** | 0.007 | 0.026 | *** | 0.007 | -0.001 | | 0.010 | 0.043 | ** | 0.023 | 0.025 | *** | 0.013 | 0.023 | *** | 0.011 | 0.104 | *** | 0.043 |
| ***Personal Characteristics*** | | | | | | | | | | | | | | | | | | | | | |
| *Male* | -0.027 | *** | 0.004 | -0.034 | *** | 0.004 | -0.030 | *** | 0.006 | -0.037 | *** | 0.009 | -0.026 | *** | 0.011 | -0.031 | *** | 0.006 | -0.057 | *** | 0.023 |
| *Married* | 0.014 | *** | 0.004 | 0.012 | *** | 0.004 | 0.007 | | 0.006 | 0.021 | *** | 0.008 | 0.024 | *** | 0.012 | 0.003 | | 0.006 | -0.027 | | 0.025 |
| ***Earnings*** | | | | | | | | | | | | | | | | | | | | | |
| *Income* | 0.009 | *** | 0.004 | 0.011 | *** | 0.004 | 0.011 | *** | 0.005 | 0.011 | | 0.011 | 0.001 | | 0.011 | 0.012 | | 0.008 | 0.035 | *** | 0.017 |
| ***Hours*** | | | | | | | | | | | | | | | | | | | | | |
| *21 - 30 hours* | 0.050 | *** | 0.013 | 0.044 | *** | 0.012 | 0.035 | *** | 0.017 | 0.184 | * | 0.096 | 0.057 | | 0.039 | 0.011 | | 0.015 | 0.028 | | 0.052 |
| *31 - 40 hours* | 0.052 | *** | 0.009 | 0.045 | *** | 0.008 | 0.047 | *** | 0.011 | 0.068 | | 0.045 | 0.058 | *** | 0.021 | 0.023 | *** | 0.011 | 0.044 | | 0.047 |
| *41 - 50 hours* | 0.097 | *** | 0.013 | 0.086 | *** | 0.012 | 0.104 | *** | 0.018 | 0.080 | | 0.049 | 0.100 | *** | 0.035 | 0.058 | *** | 0.022 | 0.100 | *** | 0.050 |
| *51 - 60 hours* | 0.147 | *** | 0.023 | 0.128 | *** | 0.018 | 0.135 | *** | 0.034 | 0.089 | | 0.056 | 0.179 | *** | 0.070 | 0.115 | *** | 0.048 | 0.150 | ** | 0.083 |
| *60 + hours* | 0.187 | *** | 0.034 | 0.160 | *** | 0.032 | 0.156 | *** | 0.055 | 0.133 | * | 0.077 | 0.221 | *** | 0.106 | 0.068 | | 0.053 | 0.254 | * | 0.150 |
| ***Job Characteristics*** | | | | | | | | | | | | | | | | | | | | | |
| *Public sector* | -0.003 | | 0.004 | -0.004 | | 0.004 | -0.001 | | 0.006 | 0.005 | | 0.008 | -0.026 | *** | 0.011 | 0.001 | | 0.005 | 0.067 | * | 0.039 |
| *Boss* | 0.022 | *** | 0.005 | 0.025 | *** | 0.005 | 0.021 | *** | 0.006 | 0.041 | *** | 0.013 | 0.020 | | 0.014 | 0.022 | *** | 0.007 | -0.065 | | 0.041 |
| *Trade union* | 0.024 | *** | 0.005 | 0.016 | *** | 0.004 | 0.020 | *** | 0.007 | 0.011 | | 0.009 | 0.025 | *** | 0.013 | 0.001 | | 0.006 | 0.032 | | 0.023 |
| *Non-pecuniary advantages* | - | | - | -0.006 | *** | 0.002 | -0.009 | *** | 0.003 | -0.007 | *** | 0.003 | -0.004 | | 0.005 | -0.004 | | 0.003 | -0.022 | *** | 0.009 |
| *Working relations* | - | | - | -0.020 | *** | 0.002 | -0.017 | *** | 0.003 | -0.018 | *** | 0.004 | -0.020 | *** | 0.005 | -0.016 | *** | 0.003 | -0.045 | *** | 0.009 |
| *Physical demand of the job* | - | | - | 0.032 | *** | 0.002 | 0.027 | *** | 0.004 | 0.030 | *** | 0.004 | 0.042 | *** | 0.006 | 0.023 | *** | 0.004 | 0.062 | *** | 0.012 |
| ***Occupation*** | | | | | | | | | | | | | | | | | | | | | |
| *Agriculture* | -0.044 | *** | 0.011 | -0.045 | *** | 0.009 | -0.032 | *** | 0.015 | -0.028 | | 0.030 | -0.064 | *** | 0.015 | -0.030 | *** | 0.012 | - | | |
| *Crafts* | 0.007 | | 0.007 | 0.014 | *** | 0.007 | 0.014 | | 0.011 | 0.027 | *** | 0.012 | 0.030 | | 0.022 | 0.010 | | 0.009 | -0.016 | | 0.029 |
| *Professionals* | 0.044 | *** | 0.010 | 0.076 | *** | 0.011 | 0.066 | *** | 0.017 | 0.158 | *** | 0.034 | 0.045 | | 0.036 | 0.041 | *** | 0.015 | 0.198 | | 0.146 |
| *Skilled technicians* | 0.043 | *** | 0.008 | 0.073 | *** | 0.009 | 0.065 | *** | 0.015 | 0.147 | *** | 0.027 | 0.056 | | 0.037 | 0.037 | *** | 0.012 | -0.026 | | 0.027 |
| *Admin & clerks* | 0.021 | *** | 0.008 | 0.051 | *** | 0.009 | -0.038 | *** | 0.013 | 0.131 | *** | 0.035 | 0.038 | * | 0.023 | 0.025 | ** | 0.013 | 0.002 | | 0.029 |
| ***Country*** | | | | | | | | | | | | | | | | | | | | | |
| *West Germany* | 0.023 | *** | 0.011 | 0.033 | *** | 0.011 | 0.023 | *** | 0.010 | - | | - | - | | - | - | | - | - | | - |
| *Hungary* | 0.028 | | 0.019 | 0.022 | | 0.017 | - | | - | - | | - | - | | - | - | | - | - | | - |
| *Italy* | -0.010 | | 0.015 | -0.019 | | 0.012 | - | | - | - | | - | - | | - | - | | - | - | | - |
| *Norway* | 0.010 | | 0.009 | 0.009 | | 0.008 | - | | - | - | | - | - | | - | -0.027 | *** | 0.006 | - | | - |
| *Sweden* | 0.043 | *** | 0.012 | 0.046 | *** | 0.012 | - | | - | - | | - | - | | - | - | | - | - | | - |
| *Czech Republic* | -0.050 | *** | 0.008 | -0.048 | *** | 0.007 | - | | - | -0.068 | *** | 0.010 | - | | - | - | | - | - | | - |
| *Poland* | 0.037 | *** | 0.018 | 0.020 | | 0.015 | - | | - | -0.011 | | 0.011 | - | | - | - | | - | - | | - |
| *Canada* | 0.024 | *** | 0.011 | 0.011 | | 0.009 | 0.016 | | 0.010 | - | | - | - | | - | - | | - | - | | - |
| *Japan* | 0.024 | *** | 0.012 | 0.015 | | 0.011 | - | | - | - | | - | - | | - | - | | - | - | | - |
| *Spain* | 0.001 | | 0.013 | 0.005 | | 0.012 | - | | - | - | | - | -0.013 | | 0.036 | - | | - | - | | - |
| *France* | 0.047 | *** | 0.013 | 0.030 | *** | 0.011 | 0.033 | *** | 0.012 | - | | - | - | | - | - | | - | - | | - |
| *Portugal* | 0.069 | *** | 0.018 | 0.086 | *** | 0.018 | - | | - | - | | - | 0.044 | | 0.049 | - | | - | - | | - |
| *Denmark* | -0.021 | *** | 0.008 | -0.015 | *** | 0.007 | - | | - | - | | - | - | | - | -0.046 | *** | 0.006 | - | | - |
| *Switzerland* | -0.016 | *** | 0.007 | -0.011 | | 0.007 | -0.015 | *** | 0.007 | - | | - | - | | - | - | | - | - | | - |
| *No of observations* | 9240 | | | 9240 | | | 3633 | | | 1354 | | | 1317 | | | 2422 | | | 514 | | |
| *Log likelihood/Pseudo R2* | -12299 | | 0.035 | -12032 | | 0.055 | -4415 | | 0.053 | -1821 | | 0.084 | -1871 | | 0.047 | -2804 | | 0.055 | -649 | | 0.107 |

Note: Western countries = West Germany, Switzerland, Canada, France, UK (base category) Eastern European countries = Czech Republic, Poland, Hungary (base category)
Mediterranean countries = Spain, Portugal , Italy (base category) Nordic countries = Norway, Denmark, Sweden (base category)

## Table 2: Probability of quitting regressions

| | Whole sample | | | Men | | | Woman | | |
|---|---|---|---|---|---|---|---|---|---|
| ***Quitting intention*** | ***dF/dx*** | | ***Std. Err.*** | ***dF/dx*** | | ***Std. Err.*** | ***dF/dx*** | | ***Std. Err.*** |
| ***Stress*** | | | | | | | | | |
| *Always stressed* | 0.137 | *** | 0.024 | 0.124 | *** | 0.033 | 0.160 | *** | 0.035 |
| *Often stressed* | 0.077 | *** | 0.016 | 0.061 | *** | 0.022 | 0.101 | *** | 0.023 |
| *Some stress* | 0.034 | *** | 0.013 | 0.018 | | 0.018 | 0.057 | *** | 0.020 |
| ***Age*** | | | | | | | | | |
| *Age 25 - 34* | -0.073 | *** | 0.015 | -0.058 | *** | 0.022 | -0.082 | *** | 0.019 |
| *Age 35 - 44* | -0.124 | *** | 0.014 | -0.123 | *** | 0.021 | -0.118 | *** | 0.019 |
| *Age 45 - 54* | -0.167 | *** | 0.013 | -0.160 | *** | 0.019 | -0.163 | *** | 0.017 |
| *Age 55 - 65* | -0.195 | *** | 0.008 | -0.191 | *** | 0.014 | -0.195 | *** | 0.010 |
| ***Education*** | | | | | | | | | |
| *Secondary school* | 0.007 | | 0.015 | 0.005 | | 0.020 | 0.003 | | 0.021 |
| *University* | 0.029 | | 0.018 | 0.011 | | 0.025 | 0.048 | * | 0.027 |
| ***Personal Characteristics*** | | | | | | | | | |
| *Male* | 0.038 | *** | 0.010 | - | | - | - | | - |
| *Married* | -0.041 | *** | 0.011 | -0.036 | *** | 0.016 | -0.046 | *** | 0.015 |
| *Income* | -0.052 | *** | 0.010 | -0.058 | *** | 0.016 | -0.058 | *** | 0.013 |
| ***Hours*** | | | | | | | | | |
| *21 - 30 hours* | -0.015 | | 0.022 | -0.110 | *** | 0.035 | 0.014 | | 0.026 |
| *31 - 40 hours* | -0.024 | | 0.020 | -0.125 | *** | 0.046 | 0.010 | | 0.024 |
| *41 - 50 hours* | 0.010 | | 0.022 | -0.094 | ** | 0.042 | 0.009 | | 0.028 |
| *51 - 60 hours* | 0.029 | | 0.030 | -0.066 | | 0.042 | 0.067 | | 0.053 |
| *60 + hours* | 0.039 | | 0.039 | -0.071 | | 0.044 | 0.126 | * | 0.075 |
| ***Job Characteristics*** | | | | | | | | | |
| *Public sector* | -0.047 | *** | 0.010 | -0.056 | *** | 0.015 | -0.046 | *** | 0.014 |
| *Boss* | -0.004 | | 0.011 | 0.002 | | 0.015 | -0.009 | | 0.016 |
| *Trade union* | -0.056 | *** | 0.011 | -0.058 | *** | 0.015 | -0.055 | *** | 0.016 |
| ***Occupation*** | | | | | | | | | |
| *Agriculture* | -0.059 | | 0.039 | -0.085 | | 0.044 | 0.038 | | 0.090 |
| *Crafts* | 0.001 | | 0.015 | 0.013 | | 0.021 | -0.026 | | 0.022 |
| *Professionals* | -0.001 | | 0.019 | 0.012 | | 0.026 | -0.025 | | 0.027 |
| *Skilled technicians* | -0.019 | | 0.016 | -0.001 | | 0.023 | -0.055 | *** | 0.022 |
| *Admin & clerks* | -0.024 | | 0.016 | -0.011 | | 0.026 | -0.049 | ** | 0.022 |
| ***Country*** | | | | | | | | | |
| *Germany* | -0.085 | *** | 0.019 | -0.064 | ** | 0.031 | -0.096 | *** | 0.024 |
| *Hungary* | -0.173 | *** | 0.013 | -0.155 | *** | 0.027 | -0.187 | *** | 0.012 |
| *Italy* | 0.089 | ** | 0.047 | 0.133 | ** | 0.071 | 0.109 | * | 0.071 |
| *Norway* | 0.033 | | 0.025 | 0.060 | * | 0.039 | 0.022 | | 0.032 |
| *Sweden* | 0.009 | | 0.026 | 0.040 | | 0.042 | -0.009 | | 0.033 |
| *Czech Republic* | -0.094 | *** | 0.023 | -0.065 | | 0.041 | -0.127 | *** | 0.023 |
| *Poland* | -0.101 | *** | 0.023 | -0.048 | | 0.047 | -0.145 | *** | 0.021 |
| *Canada* | 0.015 | | 0.027 | 0.066 | | 0.046 | -0.022 | | 0.032 |
| *Japan* | -0.108 | *** | 0.018 | -0.042 | | 0.037 | -0.151 | *** | 0.016 |
| *Spain* | -0.093 | *** | 0.021 | -0.062 | | 0.035 | -0.116 | *** | 0.025 |
| *France* | 0.171 | *** | 0.032 | 0.238 | *** | 0.515 | 0.115 | *** | 0.039 |
| *Portugal* | -0.072 | *** | 0.022 | -0.049 | | 0.038 | -0.105 | *** | 0.024 |
| *Denmark* | 0.121 | *** | 0.033 | 0.122 | *** | 0.050 | 0.131 | *** | 0.045 |
| *Switzerland* | -0.010 | | 0.022 | 0.021 | | 0.035 | -0.181 | | 0.028 |
| *No of observations* | 9240 | | | 4808 | | | 4432 | | |
| *Log likelihood* | -4317.44 | | | -2280.95 | | | -2002.22 | | |
| *Pseudo R2* | 0.107 | | | 0.107 | | | 0.121 | | |

## Table 3: Absence from job regressions

| | Whole sample | | | Men | | | Woman | | |
|---|---|---|---|---|---|---|---|---|---|
| **Absence** | **dF/dx** | | **Std. Err.** | **dF/dx** | | **Std. Err.** | **dF/dx** | | **Std. Err.** |
| ***Stress*** | | | | | | | | | |
| *Always stressed* | 0.102 | *** | 0.025 | 0.071 | ** | 0.036 | 0.13 | *** | 0.034 |
| *Often stressed* | 0.08 | *** | 0.018 | 0.057 | ** | 0.025 | 0.103 | *** | 0.027 |
| *Some stress* | 0.075 | *** | 0.017 | 0.067 | *** | 0.023 | 0.082 | *** | 0.025 |
| ***Age*** | | | | | | | | | |
| *Age 25 - 34* | -0.039 | * | 0.024 | -0.079 | *** | 0.033 | 0.012 | | 0.034 |
| *Age 35 - 44* | -0.113 | *** | 0.024 | -0.131 | *** | 0.033 | -0.08 | *** | 0.035 |
| *Age 45 - 54* | -0.164 | *** | 0.024 | -0.174 | *** | 0.034 | -0.14 | *** | 0.035 |
| *Age 55 - 65* | -0.174 | *** | 0.026 | -0.194 | *** | 0.033 | -0.133 | *** | 0.041 |
| ***Education*** | | | | | | | | | |
| *Secondary school* | -0.02 | | 0.019 | -0.041 | | 0.025 | 0.01 | | 0.028 |
| *University* | 0.01 | | 0.023 | 0.006 | | 0.03 | 0.022 | | 0.034 |
| ***Personal Characteristics*** | | | | | | | | | |
| *Male* | -0.055 | *** | 0.013 | - | | - | - | | - |
| *Married* | 0.007 | | 0.014 | -0.004 | | 0.02 | 0.021 | | 0.019 |
| *Income* | -0.004 | | 0.014 | -0.025 | | 0.021 | 0.006 | | 0.019 |
| ***Hours*** | | | | | | | | | |
| *21-30 hours* | 0.071 | ** | 0.031 | 0.036 | | 0.078 | 0.063 | * | 0.035 |
| *31-40 hours* | 0.081 | *** | 0.026 | 0.087 | | 0.06 | 0.063 | ** | 0.031 |
| *41-50 hours* | 0.006 | | 0.029 | -0.001 | | 0.062 | -0.001 | | 0.036 |
| *51-60 hours* | -0.024 | | 0.037 | -0.053 | | 0.066 | 0.035 | | 0.058 |
| *60+ hours* | -0.02 | | 0.046 | -0.012 | | 0.074 | -0.078 | | 0.077 |
| ***Job Characteristics*** | | | | | | | | | |
| *Public sector* | 0.052 | *** | 0.014 | 0.035 | * | 0.019 | 0.057 | *** | 0.02 |
| *Boss* | -0.034 | *** | 0.014 | -0.017 | | 0.019 | -0.05 | ** | 0.022 |
| *Trade union* | 0.026 | * | 0.014 | 0.003 | | 0.019 | 0.054 | *** | 0.022 |
| ***Occupation*** | | | | | | | | | |
| *Agriculture* | -0.012 | | 0.059 | -0.012 | | 0.066 | -0.067 | | 0.12 |
| *Crafts* | -0.06 | *** | 0.018 | -0.045 | * | 0.024 | -0.086 | *** | 0.029 |
| *Professionals* | -0.078 | *** | 0.023 | -0.07 | *** | 0.03 | -0.097 | *** | 0.038 |
| *Skilled technicians* | -0.062 | *** | 0.021 | -0.053 | * | 0.027 | -0.088 | *** | 0.033 |
| *Admin & clerks* | -0.025 | | 0.022 | -0.015 | | 0.032 | -0.053 | * | 0.032 |
| ***Country*** | | | | | | | | | |
| *Germany* | -0.044 | | 0.032 | -0.049 | | 0.044 | -0.019 | | 0.048 |
| *Hungary* | -0.236 | *** | 0.038 | -0.218 | *** | 0.055 | -0.275 | *** | 0.053 |
| *Italy* | -0.085 | * | 0.048 | -0.035 | | 0.069 | -0.087 | | 0.075 |
| *Norway* | -0.063 | ** | 0.028 | -0.021 | | 0.041 | -0.101 | *** | 0.04 |
| *Sweden* | -0.002 | | 0.032 | 0.006 | | 0.046 | -0.013 | | 0.046 |
| *Czech Republic* | -0.089 | ** | 0.041 | -0.105 | * | 0.058 | -0.087 | | 0.06 |
| *Poland* | -0.185 | *** | 0.04 | -0.221 | *** | 0.053 | -0.157 | *** | 0.059 |
| *Canada* | 0.075 | ** | 0.035 | 0.124 | *** | 0.051 | 0.038 | | 0.048 |
| *Japan* | 0.269 | *** | 0.033 | 0.341 | *** | 0.046 | 0.208 | *** | 0.048 |
| *Spain* | -0.222 | *** | 0.031 | -0.187 | *** | 0.043 | -0.282 | *** | 0.046 |
| *France* | -0.281 | *** | 0.024 | -0.271 | *** | 0.033 | -0.287 | *** | 0.035 |
| *Portugal* | -0.129 | *** | 0.033 | -0.133 | *** | 0.046 | -0.131 | *** | 0.047 |
| *Denmark* | -0.016 | | 0.034 | 0.008 | | 0.049 | -0.035 | | 0.048 |
| *Switzerland* | -0.063 | ** | 0.028 | 0.019 | | 0.042 | -0.143 | *** | 0.039 |
| *No of observations* | 9013 | | | 4735 | | | 4278 | | |
| *Log likelihood* | -5758.467 | | | -2982.635 | | | -2743.285 | | |
| *Pseudo R2* | 0.07 | | | 0.07 | | | 0.07 | | |

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