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Does job insecurity deteriorate health? A causal approach for Europe.

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Abstract

This paper estimates the causal effect of job insecurity on health in a sample of 22 European countries. We rely on an original instrumental variable approach based on evidence that workers feel more insecure with respect to their job if employed in sectors with a high natural rate of layoff, but relatively less so if they live in a country where employment is strongly protected by the law. Using cross-country data from the 2010 European Working Conditions Survey, we show that when the potential endogeneity of job insecurity is not accounted for, the latter appears to deteriorate almost all health outcomes. When tackling the endogeneity issue, the health-damaging effect of job insecurity is confirmed for a subgroup of health outcomes, namely self-rated health, being sick in the past 12 month, suffering from headaches or eyestrain and depression or anxiety. As for other health variables, the impact of job insecurity appears to be insignificant at conventional levels.

Keywords : Job insecurity; Health; Instrumental Variables

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1 Introduction

Over the past thirty years, popular concern about job security has increased in a large number of industrialized countries. Following several downsizing episodes in the USA and in Europe, a widely shared view has developed according to which employment relationships have become more unstable than they used to be. Internal labor markets characterized by long careers within firms (Doeringer and Piore (1971)) have been undermined. Long-term employer-employee relationships have declined (Cappelli (1999); Givord and Maurin (2004)) and the labor market seems to have been increasingly working like a spot market (Atkinson (2001)). Correspondingly, perceived job insecurity - i.e. the fear of involuntary job loss - has increased in most OECD countries since the 1990s (OECD (2004)).

This increase in perceived job insecurity has affected workers' well-being in various ways. There is evidence in the literature that job insecurity has a strong negative impact on job satisfaction (Böckerman et al. (2011)). This impact is actually much stronger than that of the actual type of work contract held by workers -permanent vs. temporary- (Bardasi and Francesconi (2004)). In a recent paper, Origo and Pagani (2009) show that the level of job satisfaction of workers who do not experience job insecurity[1] is not statistically different whether they have a permanent or a temporary contract. In contrast, workers who feel that their job is insecure are significantly less satisfied than workers who do not, whatever their type of work contract.

A wide literature in epidemiology and public health has long underlined the potential effect of job insecurity on another dimension of workers' well-being, namely health. Job insecurity would be harmful to health because it increases stress (Green (2011)). Psychologists have indeed shown that the anticipation of a stressful event represents an equally important or even greater source of anxiety than the event itself (Lazarus and Folkman (1984)). Consistently, job insecurity appears to raise self-reported general and psychological morbidity but also sickness absence and health service use - see the review of the literature by Ferrie (2001). In particular, it is strongly associated with specific symptoms such as eyestrain, skin and ear problems, stomach and sleep disorders (Yawen Chenga et al. (2005)). It also negatively affects mental health, as measured by a 30-item psychiatric morbidity scale and a subscale for depressive factors (Ferrie et al. (2005)).

However, evaluating the causal impact of job insecurity on health raises a challenge which requires an adequate identification strategy. Perceived job insecurity is indeed likely to be endogenous. Omitted variable bias may be a problem if pessimistic individuals perceive

[1] Workers are considered as *not* experiencing job insecurity if they report that it is not very likely or not at all likely that they lose their job in the next 12 months.

higher job insecurity and, at the same time, report a lower health status. Reverse causality is also likely to be a concern if unhealthy individuals are more likely to be employed in insecure jobs or if, on the contrary, negative health shocks make individuals more likely to fear that they could be fired. In all cases, standard OLS or probit estimates will be biased and will only capture the mere correlation between health and job insecurity.

In this paper, we implement an original identification strategy which allows us to estimate the causal effect of job insecurity on health in a sample of 22 European countries. We rely on an instrumental variable approach based on the empirical framework proposed by Bassanini et al. (2009). We assume that workers feel more insecure with respect to their job if employed in sectors with a high natural rate of layoff, but relatively less so if they live in a country where employment is strongly protected by the law. We thus instrument perceived job insecurity by the natural layoff rate in the sector where the individual is employed interacted with the stringency of the employment protection legislation in her country. Using cross-country data from the 2010 European Working Conditions Survey (EWCS), we show that when the potential endogeneity of job insecurity is not accounted for, the latter appears to deteriorate almost all health outcomes (self-rated health, having been sick in the past 12 months, suffering from skin and back problems, muscular pain, headaches or eyestrain, stomach ache, depression or anxiety, overall fatigue and insomnia). When tackling the endogeneity issue by estimating an IV model, the health-damaging effect of job insecurity is confirmed for a subgroup of health outcomes, namely self-rated health, being sick in the past 12 month, suffering from headaches or eyestrain and depression or anxiety. As for other health variables, the impact of job insecurity appears to be insignificant at conventional levels.

Our paper contributes to the existing literature in several ways. First, we provide a causal estimate of the impact of perceived job insecurity on health. The vast epidemiology and public health literature on this topic mostly estimates correlations. Part of it focuses on "attributed" job insecurity as captured by atypical employment (i.e. temporary rather than permanent work contracts) and finds no association between temporary work and general health. In contrast, atypical employment appears to be correlated with ill mental health (Bardasi and Francesconi (2004)). The largest strand in this literature deals with perceived job insecurity, as we do. A meta-analysis conducted by Sverke et al. (2002) on 72 papers shows that both physical and mental health are found to decrease as job insecurity increases. However, the magnitude of the effects appears to be ambiguous. On Taiwanese data, Yawen Chenga et al. (2005) find that job insecurity is associated with poor self-rated health, with the coefficient being larger for men than for women and, among women, for those employed in managerial and professional occupations. Using a cross-national survey, László et al. (2010) find differences across countries: job insecurity is associated with poor

health in the Czech Republic, Denmark, Germany, Hungary, the Netherlands and Poland while the correlation is insignificant in countries such as Austria, France, Greece, Italy, Spain and Switzerland. In all cases, these papers estimate multivariate linear or logistic models disregarding the possibility that job insecurity be endogenous. A few papers take into account the fact that time-invariant omitted variables may bias their results and estimate fixed-effect models. Using such an approach on Australian data, Green (2011) finds that perceived job insecurity negatively affects mental health.
In this paper, we take into account the fact that job insecurity may be endogenous, not only because of omitted time-invariant variables, but also because of time-varying factors and/or reverse causality. To overcome these identification problems, we implement an original IV strategy which allows us to estimate the causal impact of job insecurity on health.

Our research relates in a more indirect way to the literature on job loss and health. Sullivan and Von Wachter (2009) consider the impact of job displacement on mortality in a cohort of Pennsylvanian workers. In order to control for potential selection of displaced workers, they include the mean and variance of individual wages in their estimates as a proxy of productive ability. They show that high-tenure male workers displaced during the early and mid-1980s in the course of mass layoffs experience a 50 to 100% increase in the mortality hazard during the years immediately following job loss. The effect decreases as time passes but converges to a 10-15% increase in the long run. Another strand of literature considers plant closure events in which the whole of the firm's workforce is made redundant. Scholars use propensity score matching (or weighting) methods and compare health outcomes for workers who have been displaced because of closing plant and workers who have stayed in their job in a continuously living plant. On Danish data, Browning et al. (2006) find no evidence of higher risk of hospitalization for stress-related diseases following displacement. Similarly, Eliason and Storrie (2009b) find that displacement does not significantly increase the risk of severe cardiovascular diseases in Sweden. In contrast, they find evidence of a higher probability of hospitalization due to alcohol-related conditions. In a companion paper, they also find higher mortality from alcohol-related conditions and suicides and, to some extent, from ischemic diseases (Eliason and Storrie (2009a)). Similar results for mortality are found by Browning and Heinesen (2012) on Danish data: the risk of mortality is much higher in the displacement group than in the control group. Beyond mortality and hospitalization, Salm (2009) considers a variety of health outcomes and compares those of individuals who lost their job due to plant closure with individuals who did not, before and after the closure of the plant. The results display no significant impact of job loss on health whatever the type of health outcome. Deb et al. (2011) use what they consider a more exogenous measure of job loss than mass layoffs or plant closing, namely business closing. They show that a majority of individuals experience no negative effect of business closing on their BMI and alcohol consumption, while a small minority reports adverse changes. Overall, the literature

on job loss has dedicated a lot of effort to properly identify its effect on health outcomes even if the exogeneity of plant or even business closure is still debated - see Deb et al. (2011). In the present paper, we also try to identify causal effects on health but we focus on perceived job insecurity rather than job loss as the key variable of interest. Both variables are clearly related since job loss may generate job insecurity for survivors or for workers expecting to be fired. However, job insecurity is likely to affect a much larger group of workers since it is a subjective feeling which may not coincide with effective job loss.

To our knowledge, the only paper considering the impact of perceived job insecurity, rather than job loss, on health, tackling endogeneity issues is Ferrie et al. (1995). They use the Whitehall II sample and exploit the foreseen privatization of the Property Services Agency, which used to be part of the London-based civil service. More specifically, they use a difference-in-difference approach and compare the health outcomes of those workers who knew they would be affected by privatization and a control group of civil servants who knew they would not, before and after privatization was announced. Given that it was public knowledge that the PSA privatization would have brought about some redundancies, this set-up allows to estimate the effect of an exogenous shock on perceived job security on health. The authors find major negative effects on a large range of health outcomes for men, whereas health-damaging effects appear to be milder for women.
Our paper uses a different identification method based on instrumental variables and extends this research in scope: while Ferrie et al. (1995) focus on one type of job (civil servants) in one country (the UK), we consider the impact of job insecurity on health in a large variety of jobs and sectors in 22 European countries.

The rest of the paper is organized as follows. Section 2 presents our empirical strategy. Section 3 describes the data that we use. Section 4 reports our results and Section 5 concludes.

2 Empirical Specification

We investigate the impact of perceived job insecurity on health. As a first step, we estimate the following model by a standard probit:

$$Health^*_{ijs} = \alpha + \gamma JobIns_{ijs} + X_{ijs}\beta + D_j + D_s + u_{ijs} \tag{1}$$

where $Health^*_{ijs}$ denotes the latent health status of individual i in country j and industry s and is only observed as:

$$Health_{ijs} = \mathbb{1}_{\{Health^*_{ijs}>0\}} \tag{2}$$

$JobIns_{ijs}$ denotes the perceived job insecurity of individual i in country j and industry

s. X_{ijs} is a vector of individual and firm characteristics. D_j and D_s are respectively country and industry dummies and u_{ijs} is an error term.
In some specifications we control for working conditions and psychosocial environment characteristics. The former capture adverse physical working conditions. The latter include indicators of job strain (job pressure, decision latitude and skill discretion) consistent with the Job Demand Control Model proposed by Karasek (1979) as well as a measure of Effort-Reward Imbalance which may be an additional source of job strain according to Siegrist (1996). Both working conditions $WorkCond_{ijs}$ and psychosocial work environment $PsychoSoc_{ijs}$ are indeed likely to be correlated with health and perceived job insecurity. If jobs which are insecure are simply lousy jobs, they may also be characterized by bad working conditions and high job strain. In that case, omitting the latter two variables generates an upward bias in the estimate of γ. In order to control for both physical working conditions and psychosocial work environment, we estimate the following equation :

$$Health^*_{ijs} = \alpha + \gamma JobIns_{ijs} + X_{ijs}\beta + \mu WorkCond_{ijs} + PsychoSoc_{ijs}\xi + D_j + D_s + v_{ijs} \quad (3)$$

However, perceived job insecurity $JobIns_{ijs}$ is likely to be endogeneous in which case the probit estimate of γ is inconsistent. Endogeneity may arise either from omitted variable bias or reverse causality. As job insecurity and health variables are both self-declared, our estimates are biased if pessimistic individuals systematically tend to report higher job insecurity and lower health status (and the reverse holds for optimistic individuals). Reverse causality is another potential source of bias if unhealthy individuals are more likely to be employed in insecure jobs. This is also a concern if negative health shocks make individuals fear that they could be fired.

In order to overcome potential endogeneity problems, we rely on an instrumental variable approach. We estimate a probit model[2] where $JobIns_{ijs}$ is a continuous and endogeneous variable. We instrument $JobIns_{ijs}$ based on the empirical framework proposed by Bassanini et al. (2009). The first-stage equation is:

$$JobIns_{ijs} = \delta EPR_j * LR_{s,USA} + X_{ijs}\zeta + D_j + D_s + \eta_{ijs} \quad (4)$$

where $LR_{s,USA}$ is the layoff rate in industry s in the USA and EPR_j denotes the employment protection legislation for regular contracts in country j. In the second-stage, equation (1) is then estimated by a probit model where $\widehat{JobIns_{ijs}}$ substitutes for $JobIns_{ijs}$.

The intuition behind the choice of the instrument is the following. Perceived job insecurity $JobIns_{ijs}$ is assumed to be higher in industries where the natural layoff propensity

[2]All health outcomes are binary variables. Further details are available in the data section.

is higher. We proxy the latter by the industry-level layoff rate in the USA. The reason for choosing this country as a baseline is that dismissal regulations are almost nonexistent in the USA - see Venn (2009) - so that the observed layoff rates may be considered as capturing the natural layoff propensity in the corresponding industries. Of course, the natural layoff propensity in an industry is not, *per se*, a valid instrument for perceived job insecurity since workers may self-select into industries. If unhealthy workers prefer to be employed in low-layoff industries, the orthogonality condition is not satisfied and the instrument is not valid. This is why we instrument job insecurity by the natural layoff propensity in the industry where the worker is employed interacted with the stringency of employment protection legislation EPR_j in the country where she leaves. The index for employment protection of regular labor contracts is provided by the **?** and refers to the legislation regarding individual dismissals. It is built out of information on notification procedures, delays before the notice period can start, the length of the notice period and size of severance payments, the circumstances under which a dismissal is considered unfair and compensation and extent of reinstatement following unfair dismissal - see Bassanini et al. (2009). The assumption underlying our instrument is that workers employed in sectors with a high natural layoff propensity (i.e. who are more at risk of being dismissed) feel comparatively more secure, as far as their job is concerned, in countries where employment protection is more stringent. We consider employment protection of regular labor contracts only (and restrict our sample accordingly to permanent workers) because it is not clear whether the rules restricting the use of temporary contracts - i.e. employment protection legislation for such contracts - actually protect temporary workers or rather permanent ones, by making temporary work either more costly or less convenient to use (Caroli et al. (2008)). Note that our instrument captures the risk of being dismissed which is likely to be a good predictor of the perceived risk of losing one's job, i.e. our job insecurity indicator. Finding a good instrument would have been more complicated should our variable of interest have been the individual's satisfaction with her job security. The latter is indeed likely to be determined not only by the risk of losing one's job, but also by the expected level of unemployment benefit and the probability of re-employment if dismissed. In the present case, our job insecurity variable captures the perceived risk of dismissal which is easier to predict since it does not depend on expectations about future well-being but only on the actual risk of dismissal faced by the individual.

As robustness checks, we control for working conditions and psychosocial work environment in our IV estimates. This is indeed standard in the epidemiology and public health literature. However, this is not our preferred specification since working conditions and psychosocial environment characteristics are likely to be co-determined together with job insecurity.

3 Data

3.1 Presentation of the sample

We use the fifth wave of the European Working Conditions Survey (EWCS). Since its launch in 1990, the EWCS measures and monitors trends and changes in working conditions in Europe. It has been conducted every five years on a random sample of workers (salaried employees and self-employed) in a growing number of European countries (from 12 in 1990 to 34 in 2010).

The European Foundation for the Improvement of Living and Working Conditions commissioned the fifth wave of the EWCS to be carried out in winter-spring 2010. Face-to-face interviews were conducted with persons in employment in the 27 Member states as well as in Norway, Macedonia, Croatia, Turkey, Albania, Kosovo and Montenegro. The questionnaire covers issues such as employment status, worker participation, and the general job context : working time, work organization, earnings and financial security, job insecurity, psychosocial work environment, work-life imbalance and access to training. It also covers several aspects of health and well-being, cognitive and psychological conditions as well as demographic and socio-economic characteristics.

In the 2010 wave, almost 44,000 workers were interviewed across 34 European countries. The original sample included all persons aged 15 and over who were resident in the country that was being surveyed and who were in employment during the reference week. Being in employment was defined as having done any work for pay or profit during the reference week for at least one hour.

Our empirical strategy uses the Employment Protection legislation index for Regular work contracts (EPR). As this index is defined only for individuals employed with a regular contract in the business sector, we exclude from the sample self-employed individuals, individuals working in non-business sectors[3], as well as individuals who did not have a regular work contract at the time of the survey. Furthermore, we exclude individuals working very short hours (less than 15 hours during the reference week). Finally, as the EPR index was unavailable for 12 countries (out of 34), our final sample contains 9,263 individuals in 22 countries[4].

[3]For issues of data reliability, agriculture, mining and fuel are excluded, so that the sectors included in our study correspond to sectors 15 to 74 in the NACE Rev. 1 classification.

[4]The EPR index is available for the following countries : Austria, Belgium, the Czech Republic, Germany, Denmark, Spain, Finland, France, the United-Kingdom, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Sweden, Turkey, Slovenia and Estonia.

3.2 Variables

In order to carry out our analysis, we need information both on perceived job insecurity and health.

Perceived job insecurity is measured using a question asking workers their opinion about the following statement : "I might lose my job in the following 6 months". Five answers are available ranging from "strongly agree" to "strongly disagree"[5]. In order to easily interpret the coefficients obtained on job insecurity, we standardize it to mean 0 and 1 standard deviation.

Measuring health using survey data is always a challenge. The EWCS questionnaire includes a question on self-rated health where respondents are asked to rate their health on a 5-point scale : very good, good, fair, bad or very bad. We dichotomize the responses into good (very good and good) and bad health (fair, bad or very bad). There is evidence in the literature that self-rated health is a good indicator of individual overall health (Ferrie et al. (1995)). It has been found to be a good predictor of mortality even after controlling for more objective measures of health (Idler and Kasl (1991); Idler and Benyamini (1997); Bath (2003)). However, self-rated health may suffer from individual reporting heterogeneity (Tubeuf et al. (2008)). This is why we also use more objective measures of health capturing specific diseases or symptoms. In the EWCS database, respondents are asked whether they suffered over the last 12 months either from skin problems, backache, muscular pain in shoulders, neck and/or upper limbs, muscular pain in lower limbs, headache or eyestrain, stomach ache, cardiovascular diseases, depression or anxiety, overall fatigue, or insomnia or general sleep difficulties. For each above-mentionned health disorder, we build a corresponding dummy variable taking value 1 if the individual suffered from it, 0 otherwise. We also exploit a question asking whether the individual worked when she was sick over the past 12 months : we build a binary variable indicating whether the respondent was sick over the past 12 months taking value 0 if the respondent answers 'I was not sick' and value 1 otherwise[6]. This is a quite uncommon measure of health, which may however capture minor health problems or frail health potentially induced by job insecurity.

We also use some information on individuals' well-being. We build a dummy variable equal to 1 if the individual answers "All the time", "Most of the time" or "More than half of the time" to at least one of the following assertions : "[Over the past two weeks] I have felt cheerful and in good spirits"; "I have felt calm and relaxed"; "I woke up feeling fresh and rested"; "My daily life has been filled with things that interest me". Our well-being dummy

[5]This is a standard way to measure the feeling of job insecurity in the literature. For example, in the Karasek's Job Content Questionnaire (JCQ), perceived job insecurity is measured on a 4-point scale by the proposition "My job is secure", where response categories range from "strongly agree" to "strongly disagree" (Karasek et al. (1998)).

[6]Since this item is not available for Germany and Denmark, we have fewer observations in our models when we use it as a dependent variable.

indicator is equal to 0 otherwise.

Our baseline specification includes a set covariates capturing individual and firm characteristics. Some specifications also control for working conditions and psychosocial work environment.

Individual and firm characteristics include age (entered as a continuous variable), gender, the presence of a spouse or partner in the household, occupation[7] (managers and professionals/technicians and supervisors/white collars/blue collars) and education[8] (higher education/secondary education/below secondary). As the income variable in the EWCS has many missing values and is not quite reliable, we use a question on the "household's ability to make ends meet" given its total monthly income. We build a dummy variable equal to 1 if individuals report that their household makes ends meet "fairly easily", "easily" or "very easily", and equal to 0 otherwise. We interpret this indicator as a measure of households' deprivation. We also use a question asking whether the individual was unemployed immediatly before this job (dummy variable equal to 1 if so, 0 otherwise), and information on the presence of an employee representative at the workplace (dummy variable equal to 1 if so, 0 otherwise).

Working conditions are captured by an index taking values 0 to 10, where 10 denotes adverse working conditions. It is the normalized sum of 15 dummy variables taking value 1 if the individual is exposed half of the time or more to a given working condition, and 0 otherwise. The 15 working condition components are : being exposed to vibrations from hard tools or machinery; to noise so loud that one would have to raise one's voice to talk to people; high temperatures which make one perspire even when not working; low temperatures whether indoors or outdoors; breathing in smoke, fumes, powder or dust; in vapors such as solvents and thinners; handling or being in skin contact with chemical products or substances; breathing tobacco smoke from other people; handling or being in direct contact with materials which can be infectious, such as waste, bodily fluids, laboratory materials; having a job that involves tiring or painful positions; lifting or moving people; carrying or moving heavy loads; standing; repetitive hand or arm movements; handling angry clients or patients.

As for psychosocial work environment characteristics, they are measured through a series of indicators adapted from the Job Content Instrument of Karasek (Karasek (1979)) and the Effort-Reward Imbalance Questionnaire (Siegrist (1996)). These indicators include job pressure, decision latitude, skill discretion and reward, and are measured as follows. Job pressure is built out of three components : having enough time to get the job done (measured on a 5-point scale where response categories range from "always" to "never"), working at high speed (7-point scale ranging from "all the time" to "never"), and working to tight

[7]Based on the 1988 International Standard Classification of Occupations (ISCO 88).

[8]Based on the International Standard Classification of Education (ISCED).

deadlines (7-point scale ranging from "all the time" to "never"). We combine the responses into a summary scale and normalize it to [0;10], where 10 denotes high job pressure. We then divide the scale into tertiles, e.g low job pressure, moderate job pressure and high job pressure. A measure of decision latitude is obtained using three dummy variables : the ability to choose or change the order of tasks, the methods of work and the speed or rate of work (all variables taking value 1 if the individual has control over the corresponding decision, 0 otherwise). We combine the responses into a summary scale, normalize it to [0;10], where 10 denotes high decision latitude, and divide it into tertiles. Skill discretion is measured by a single question asking whether one's job involves learning new things (dummy variable equal to 1 if so, 0 otherwise). Finally, workers' reward is assessed by two questions : being well paid to do one's work (measured on a 5-point scale where response categories range from "strongly disagree" to "strongly agree"); having a job that offers good prospects for career advancements (5-point scale ranging from "strongly disagree" to "strongly agree"). Responses are summed into a summary scale that is normalized to [0;10] and divided into tertiles.

3.3 Instrument

We instrument perceived job insecurity by the US layoff rate in the industry where the worker is employed interacted with the stringency of employment protection legislation EPR in the country where she leaves. We borrow US layoff rates from Bassanini and Garnero (2013). The database contains layoff rates over 1996-2006 and uses an industry classification that can be matched, at a sufficiently disaggregated level, to the Nace Rev. 1 classification used in the EWCS. Overall, we have information on 23 industry-level US layoff rates. To capture the natural industry layoff propensity, we compute a quantitative indicator equal to the average US industry layoff rate between 2000 and 2006[9]. Data on employment protection legislation are provided by the OECD[10]. We use the 2008 EPR index, the latest available in the OECD database at the time of our study. Its theoritical value varies from 0 to 6 (where 6 is the most stringent legislation). The list of industries and countries that we use, together with the US sectoral layoff rates and the national EPR indices can be found in Appendix Tables A.3 and A.4.

3.4 Descriptive statistics

Tables A.1, A.2 and A.3 provide the descriptive statistics for the full sample. As shown in Figure A.1, 31% of the workers strongly disagree with the statement that they might lose their job in the following six months, while 33% simply disagree, 19% neither agree nor

[9]We assume that the natural layoff propensity in the USA is stable over time and we average it over a complete cycle, 2000-2006.

[10]Further details on the construction of the employment protection index can be found in Venn (2009).

disagree, 13% agree and 5% strongly agree. In the sample, the average age is 41 years old, and 60% of the individuals are men. 69% live with a spouse or partner, and 37% report having difficulties to make ends meet. 9% of individuals report having had a period of unemployment immediately before their current job, and 44% have an employee representative at their workplace. While 78% of individuals declare being in good health (fair, good or very good self-rated health), we do see a number of health disorders. 47% of the workers report suffering from backache, 45% from muscular pain in upper limbs, 30% from muscular pain in lower limbs, 40% from headache or eyestrain, 37% from overall fatigue and 20% from insomnia or sleep difficulties. Overall, 94% of the individuals in our sample declare having been sick over the past 12 months. However, fewer workers report suffering from skin problems (9%), stomach ache (13%), cardiovascular diseases (5%), or depression or anxiety (10%). 92% of the individuals in the sample experienced well-being the week preceding the interview. We also control for the industry where the worker is employed. The largest proportions of respondents are found in retail trade (17%), renting and business activities (11%) and construction (11%). We also provide a country-by-country breakdown of our sample. Belgium, France and Germany are the most represented countries and Ireland is the country with fewest respondents.

4 Results

4.1 Probit estimates

Probit estimates of equations (1) and (3) are reported in Table 1[11]. Each line presents the coefficient (resp. standard error) of perceived job insecurity ($\hat{\gamma}$) for a different health outcome.[12] In column 1 we only control for individual and firm characteristics, i.e. age, gender, education, occupation, marital status, difficulties to make ends meet, period of unemployment immediatly before this job, presence of employee representatives in the establishment where the person is employed, industry and country dummies. Job insecurity appears to be positively correlated with all health disorders in our data except cardiovascular diseases. In particular, it is associated with a long series of physical troubles (skin and back problems,

[11]Once conditionning on having no missing value on any dependent variable and/or covariate (including working conditions and psychosocial factors), our sample goes down to 8108 for all health outcomes -except for having been sick over the past 12 months (7049 observations).

[12]The coefficients and standard errors on individual and firm controls are reported in Appendix Table A.5 for one particular health outcome, namely self-rated health. As could be expected, age is negatively correlated with self-rated health. Male report better health than women and so do more educated people. Once controlled for education, occupation does not appear to be significantly correlated with health. Living with a spouse or partner, being unemployed immediately before the current job and the presence of employee representatives in the firm do not seem to significantly affect self-rated health either. In contrast, having problems to make ends meet is associated with poorer self-rated health which is unsurprising if they capture to some extent low income levels.

muscular pain, headaches or eyestrain, stomach ache) as well as with depression or anxiety, overall fatigue and insomnia, all of these at the 1% significance level. Unsurprisingly, job insecurity is also associated with poorer self-rated health: when job insecurity increases by 1 standard deviation, the probability of reporting bad self-rated health increases by 12.7 percentage points which corresponds to a 16.3% increase in our sample. Job insecurity is also correlated with having been sick over the past 12 months, although more weakly (and at the 10% significance level only): a one-standard-deviation increase in job insecurity raises the probability of being sick by 5.2%. Beyond its health-damaging effect, we also find that job insecurity decreases the probability of reporting at least one dimension of well-being over the past two weeks (either feeling cheerful or relaxed or rested or having an interesting life). So, job insecurity appears to be uniformly harmful to health and to our measure of well-being.

Results are very similar when controlling for bad physical working conditions - see column (2). Whatever the health outcome or well-being variable we consider, the point estimate on job insecurity is slightly lower than when we do not include any indicator of working conditions. However, its magnitude remains in the same range as in column (1) and it is highly significant at conventional levels, except for cardiovascular diseases. The same pattern of results is also found when adding psychosocial factors to our specification - see column (3). A one-standard-deviation increase in job insecurity increases the probability of reporting bad self-rated health by 10.7%.[13]

Overall, the results from these simple probit estimates are consistent with most findings in the literature suggesting that job insecurity damages both physical and mental health and is also harmful to well-being (Ferrie (2001)).

4.2 IV estimates

However, as mentioned in section 2, job insecurity is likely to be endogenous both because of potential omitted variable bias and of reverse causality. In order to deal with this issue, we estimate a two-stage model in which $JobIns_{ijs}$ is instrumented by the natural layoff rate in the industry where worker i is employed interacted with the stringency of employment protection legislation in the country where she leaves. Results from the first-stage estimates - see equation (4) - are reported in Table 2.[14]. As expected, we find that workers employed

[13]The coefficients and standard errors on working conditions and psychosocial work environment characteristics are reported in Appendix Table A.5 for one specific health outcome - i.e. self-rated health. Unsurprisingly, bad working conditions deteriorate self-rated health. Moderate and, to a larger extent, low job pressure are associated with better health than high job pressure. As suggested by Siegrist (1996), higher rewards for given effort levels are important to workers' well-being and they appear to be correlated with better self-rated health. In contrast, decision latitude does not seem to significantly affect reported health.

[14]The coefficient and standard errors on all control variables are reported in Appendix Table A.6

in sectors characterized by a high natural rate of layoff feel comparatively less insecure when living in countries where the employment protection leglislation is more stringent. When controlling for individual and firm characteristics only - column (1) -, the coefficient on the layoff*EPR interaction is negative and significant at the 5% level. Results are virtually unchanged when controlling for working conditions and/or psychosocial work environment - see columns (2) and (3).

Second-stage estimates confirm the damaging impact of job insecurity on a number of health outcomes - see Table 3. Results in column (1) show that job insecurity increases the probability of reporting poor self-rated health and this effect is significant at the 1% level.[15] Similarly, job insecurity increases the probability of having been sick over the past 12 months. Here again, the effect is highly significant (at the 1% level). Given the indirect way in which we have defined this variable[16], one has to be careful in interpreting the results. Nonetheless, the fact that our findings based on the use of this variable are highly consistent with those obtained for self-rated health is quite reassuring and suggests that job insecurity has a substantial negative impact on general health. When trying to determine which dimension of health is most affected by job insecurity, headaches or eyestrain come up as one of the most frequent disorders. Their frequency increases whenever job security goes down and this effect is statistically significant. Job insecurity also raises the incidence of depression or anxiety. The effect is of the same order of magnitude as for headaches or eyestrain, but it is only marginally significant at conventional levels. Let us notice that whatever the health outcome considered so far, the point estimates generated by the IV method are larger than the probit's ones. This suggests that reverse causality, if any, goes in the direction of unhealthy workers self-selecting into more secure jobs rather than the other way round.

So, job insecurity seems to have a negative impact on general health as well as headaches or eyestrain and depression or anxiety. These findings are robust to controlling for working conditions and/or psychosocial work environment: the point estimates remain stable across specifications and, if anything, the effects are more significant when including additional controls - see columns (2) and (3). This is the case for depression and anxiety: the impact of job insecurity is only marginally significant in column (1) whereas it is significant at the 5% level when controlling for working conditions and/or psychosocial factors. The same goes for our indicator of well-being. The negative impact of job insecurity is insignificant when controlling only for individual and firm characteristics, while it becomes significant at conventional levels when including working conditions and psychosocial work environment.

[15] All standard errors are clusterized at the country*industry level.

[16] An individual is considered as not being sick in the past 12 months if she spontaneously answered "I was not sick" to the question "Over the past 12 months, did you work when you were sick". She was coded as having been sick otherwise (see section 3).

Concerning the other health dimensions, the impact of job insecurity is less clear. The second-stage coefficients are not statistically significant. However, given that IV estimates tend to be more imprecise than naive probit estimates, one has to be cautious in interpreting these results. A conservative interpretation of our findings is that job insecurity has clear damaging effects as regards general health, headaches or eyestrain, depression or anxiety as well as general well-being. In contrast, its causal effect on skin problems, muscular pain, back and stomach ache, insomnia and overall fatigue is much more uncertain.

4.3 Robustness checks

These results derive from estimates run on a sample of workers aged 15 years old and above. However, senior workers may overreact to job insecurity since in most countries, their probability to get back to employment if dismissed is lower than for younger workers (Esping-Andersen (2011)). In this case one could be afraid that our results be driven by a particularly strong effect of job insecurity on health for this specific age group. We check that our findings are robust to the exclusion of older workers by re-running our baseline IV estimates[17] on the group of prime-age workers (aged 25 to 59). The results are virtually unchanged with the point estimates (resp. standard errors) of job insecurity being as high as -0.963(0.141) for self-rated health, 0.785(0.443) for depression and 1.043(0.38) for being sick in the past 12 months. The only difference is that job insecurity does not seem to have any significant effect on headaches or eyestrain in the prime-age population whereas it was significant for the whole population.

Controlling for a measure of income when explaining individual health differences is standard in the literature (Lundborg (2013)). Given the scarce quality of income data in the European Working Conditions Survey, we use information on "problems to make ends meet" as an alternative in our baseline specification. However, one could be concerned that this variable might be endogenous if unhealthy workers have got problems making a living. In order to make sure that this does not generate a bias in our estimates, we re-estimate our baseline IV specification dropping this covariate. The results are essentially unaffected[18] except for depression or anxiety on which the impact of job insecurity is no longer significant at conventional levels.

[17] This specification includes controls for individual and firm characteristics only.

[18] The point estimates (resp. standard errors) of the job insecurity variable are -0.849(0.275) for self-rated health, 0.696(0.322) for headaches or eyestrain and 1.039(0.032) for being sick in the past 12 months.

5 Conclusion

In this paper, we provide a causal estimate of the effect of perceived job insecurity on various health outcomes in 22 European countries. We instrument perceived job insecurity by the natural layoff rate in the sector where the individual is employed interacted with the stringency of the employment protection legislation for permanent work contracts in her country. Using cross-country data from the 2010 European Working Conditions Survey, we show that when the potential endogeneity of job insecurity is not accounted for, the latter appears to deteriorate almost all health outcomes (self-rated health, having been sick in the past 12 months, suffering from skin and back problems, muscular pain, headaches or eyestrain, stomach ache, depression or anxiety, overall fatigue and insomnia). When tackling the endogeneity issue by estimating an IV model, findings are more mixed. The health-damaging effect of job insecurity is confirmed for a subgroup of health outcomes, namely self-rated health, being sick in the past 12 month, suffering from headaches or eyestrain and depression or anxiety. In contrast, the impact of job insecurity on other health variables comes out as insignificant. Our results are robust to controlling for individual and firm characteristics but also for adverse working conditions and psychosocial environment characteristics.
Our findings suggest that the fear of involuntary job loss has clear worsening effects on a series of physical and mental health disorders. The lack of significant impact on other health outcomes has to be interpreted with caution. IV estimates tend to be more imprecise indeed than naive probit estimates. So, a conservative interpretation of our findings is that job insecurity has clear damaging effects as regards general health, headaches or eyestrain, depression or anxiety as well as general well-being. In contrast, its causal effect on skin problems, muscular pain, back and stomach ache, insomnia and overall fatigue is more uncertain.

The strong health-damaging effects that we find for a number of health outcomes raises the issue of the mechanisms through which perceived job insecurity affects both mental and physical health. The epidemiology and public health literature has long emphasized the role of stress. Another (complementary) explanation might be that workers who are afraid of losing their job tend to increase precautionary savings and hence reduce investments, in particular in health. The lack of information about health consumption in our data does not allow us to test such a hypothesis. However, investigating the consequences of job insecurity for health investments would be extremely valuable and improve our understanding of the mechanisms through which the fear of job loss may deteriorate general health.

Another promising avenue for future research would consist in investigating the potential heterogeneity of health effects of perceived job insecurity. Reactions to job insecurity are likely to differ according to educational levels, occupations, age, marital status, gender etc. According to Green (2011) employability is a key determinant of the impact of job insecurity

upon job satisfaction. It could also well affect its impact on health outcomes. Our dataset is not large enough to allow us to run estimates for different subgroups of population. However, investigating the potential heterogeneity in individual reactions to job insecurity would provide great insight into the mechanisms through which it affects health.

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Table 1: Probit model : coefficient of job insecurity

Health outcome	Baseline	Baseline +Working conditions	Baseline +Working conditions +Psychosocial factors
	(1)	(2)	(3)
Self-rated health	-.127***	-.119***	-.083***
	(.018)	(-.119)	(.018)
Skin problems	.064***	.056**	.043*
	(.022)	(.022)	(.023)
Backache	.077***	.065***	.046***
	(.015)	(.016)	(.016)
Muscular pain in upper limbs	.103***	.093***	.070***
	(.016)	(.016)	(.016)
Muscular pain in lower limbs	.081***	.069***	.052***
	(.016)	(.017)	(.017)
Headaches, eyestrain	.085***	.079***	.064***
	(.015)	(.016)	(.016)
Stomach ache	.080***	.076***	.060***
	(.019)	(.019)	(.019)
Cardiovascular diseases	.027	.021	.005
	(.029)	(.029)	(.029)
Depression, anxiety	.160***	.153***	.127***
	(.021)	(.022)	(.022)
Overall fatigue	.095***	.086***	.061***
	(.016)	(.016)	(.016)
Insomnia, sleep difficulties	.116***	.109***	.086***
	(.017)	(.018)	(.019)
Well-being	-.162***	-.158***	-.124***
	(.023)	(.023)	(.023)
Observations	8108	8108	8108
Sick past 12 months	.049*	.046*	.035
	(.026)	(.027)	(.027)
Observations	7049	7049	7049

Notes : (1) *** : significant at the 1% level, ** : significant at the 5% level, * : significant at the 10% level. (2) Robust standard errors in parentheses. (3) Baseline specifications include controls for individual and firm characteristics: age, gender, education, occupation, marital status, difficulties to make ends meet, period of unemployment immediatly before this job, presence of an employee representative in the establishment where the person is employed, industry and country dummies. (4) Working conditions is a summary indicator of 15 adverse working conditions. (5) Psychosocial factors include job pressure, decision latitude, skill discretion and reward.

Table 2: First stage regression

	Dependent variable : Job insecurity		
	(1)	(2)	(3)
Sectoral US layoff rate*country-specific EPR	-.035**	-.037**	-.040**
	(.016)	(.016)	(.016)
Controls for individual and firm characteristics	yes	yes	yes
Controls for working conditions	no	yes	yes
Controls for psychosocial factors	no	no	yes
F-statistic	31.81	31.30	37.21
R-squared	.133	.135	.159
Observations	8108	8108	8108

Notes : (1) *** : significant at the 1% level, ** : significant at the 5% level, * : significant at the 10% level. (2) Standard errors in parentheses clusterized at the country*industry level. (3) EPR denotes employment protection legislation for regular contracts. (4) Individual and firm characteristics include age, gender, education, occupation, marital status, difficulties to make ends meet, period of unemployment immediatly before this job, presence of an employee representative in the establishment where the person is employed, industry and country dummies. (5) Working conditions is a summary indicator of 15 adverse working conditions. (6) Psychosocial factors include job pressure, decision latitude, skill discretion and reward.

Table 3: Second stage : IV coefficients of job insecurity

Health outcome	Baseline	Baseline +Working conditions	Baseline +Working conditions +Psychosocial factors
	(1)	(2)	(3)
Self-rated health	-.866***	-.890***	-.878***
	(.242)	(.212)	(.198)
Skin problems	.709	.753*	.660
	(.494)	(.436)	(.494)
Backache	.461	.489	.458
	(.550)	(.501)	(.455)
Muscular pain in upper limbs	-.509	-.476	-.435
	(.463)	(.469)	(.441)
Muscular pain in lower limbs	.439	.478	.399
	(.663)	(.607)	(.580)
Headaches, eyestrain	.699**	.723***	.669**
	(.308)	(.282)	(.281)
Stomach ache	.108	.165	.167
	(.793)	(.770)	(.694)
Cardiovascular diseases	-.442	-.362	-.456
	(.869)	(.949)	(.772)
Depression, anxiety	.770*	.804**	.758**
	(.428)	(.382)	(.380)
Overall fatigue	-.538	-.493	-.464
	(.416)	(.434)	(.394)
Insomnia, sleep difficulties	.012	.063	.067
	(.727)	(.742)	(.647)
Well-being	-.690	-.729*	-.757**
	(.464)	(.416)	(.352)
Observations	8108	8108	8108
Sick past 12 months	1.043***	1.044***	1.043***
	(.036)	(.037)	(.049)
Observations	7049	7049	7049

Notes : (1) *** : significant at the 1% level, ** : significant at the 5% level, * : significant at the 10% level. (2) Standard errors in parentheses clusterized at the country*industry level. (3) Baseline specifications include controls for individual and firm characteristics: age, gender, education, occupation, marital status, difficulties to make ends meet, period of unemployment immediatly before this job, presence of an employee representative in the establishment where the person is employed, industry and country dummies. (4) Working conditions is a summary indicator of 15 adverse working conditions. (5) Psychosocial factors include job pressure, decision latitude, skill discretion and reward.

Figure A.1: Descriptive statistics : Job insecurity distribution.

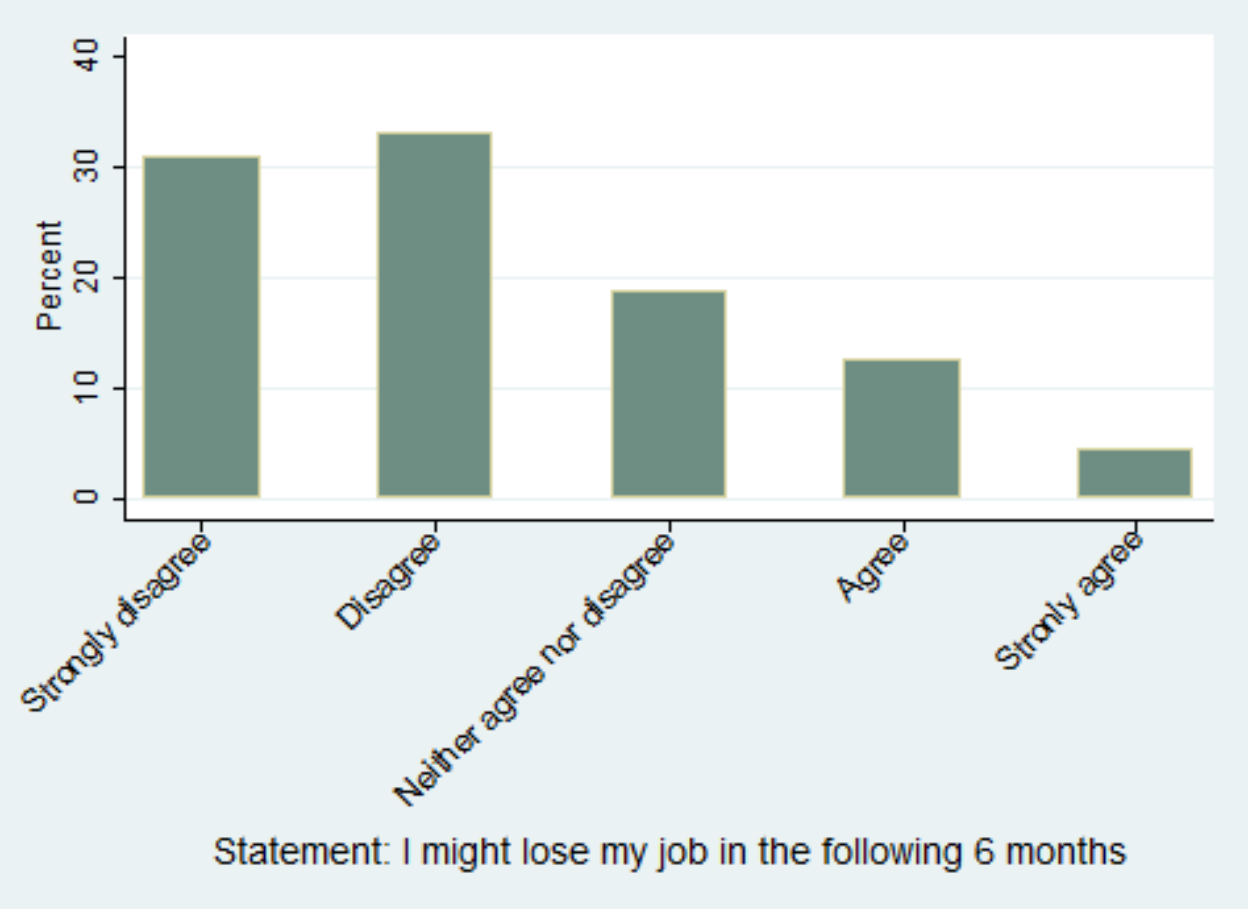

Table A.1: Descriptive statistics : Individual and firm characteristics, working conditions and psychosocial factors.

	Mean	Standard deviation
	(1)	(2)
Job insecurity (standardized)	0	(1)
Age	40.75	(10.96)
Gender		
Male	.60	(.49)
Female	.40	(.49)
Education		
Higher education	.30	(.46)
Secondary education	.66	(.47)
Below secondary	.04	(.21)
Occupation		
Managers and professionals	.15	(.36)
Technicians and supervisors	.15	(.36)
White collars	.31	(.46)
Blue collars	.38	(.49)
Marital status		
Lives with a spouse-partner	.69	(.46)
Difficulties to make ends meet	.37	(.48)
Period of unemployment immediatly before this job	.09	(.28)
Presence of an employee representative	.44	(.50)
Bad working condition index (0 to 10)	1.79	(1.65)
Job pressure index (0 to 10)	4.34	(2.46)
Decision latitude index (0 to 10)	6.46	(3.96)
Reward index (0 to 10)	4.85	(2.34)
Skill discretion	.69	(.46)
Observations	8108	8108

Notes : (1) Standard deviations in parentheses.

Table A.2: Descriptive statistics : Health variables.

	Mean	Standard deviation
	(1)	(2)
Good self-rated health	.78	(.42)
Skin problems	.09	(.28)
Backache	.47	(.50)
Muscular pain in upper limbs	.45	(.50)
Muscular pain in lower limbs	.30	(.46)
Headache, eyestrain	.40	(.49)
Stomach ache	.13	(.34)
Cardiovascular diseases	.05	(.21)
Depression, anxiety	.10	(.30)
Overall fatigue	.37	(.48)
Insomnia, sleep difficulties	.20	(.40)
Well-being	.92	(.27)
Observations	8108	8108
Sick past 12 months	.94	(.24)
Observations	7049	7049

Notes : (1) Standard deviations in parentheses. (2) All variables are binary so that the mean can be interpreted as the average frequency in the sample.

Table A.3: Descriptive statistics : Countries and industries.

Country	Frequency(%)	Industry	Frequency(%)
Austria	3.87	Food and beverages	4.22
Belgium	12.77	Textiles, wearing app. and leather	2.82
Czech Republic	3.32	Wood and wood products	0.96
Denmark	4.21	Paper, printing and publishing	2.13
Estonia	3.58	Chemicals and chemical products	2.00
Finland	3.82	Rubber and plastics	1.21
France	11.21	Non-metallic mineral products	1.07
Germany	9.46	Basic metals and fabricated metal	3.95
Greece	2.32	Machinery	2.48
Hungary	3.91	Electrical and optical equipment	2.49
Ireland	2.22	Transport equipment	2.53
Italy	4.85	Manufacturing, recycling	2.29
Netherlands	2.65	Electricity, gas and water supply	1.70
Norway	3.48	Construction	10.50
Poland	3.89	Motor trade and repair	3.93
Portugal	3.37	Wholesale trade	5.12
Slovak Republic	3.18	Retail trade	17.44
Slovenia	4.28	Hotels and restaurants	6.25
Spain	3.32	Transport and storage	7.05
Sweden	3.13	Post and telecommunications	1.63
Turkey	2.64	Financial intermediation	5.69
United Kingdom	4.54	Real estate activities	1.20
		Renting and business activities	11.33
Observations	8,108		8,108

Table A.4: Employment Protection Legislation Index for Regular contracts (EPR) in Europe (2008) and industry-level US layoff rates (mean value for 2000-2006).

Country	EPR index	Industry	US layoff rate
Austria	2.37	Food and beverages	2.83
Belgium	1.73	Textiles, wearing app. and leather	6.06
Czech Republic	3.05	Wood and wood products	5.16
Denmark	1.63	Paper, printing and publishing	3.61
Estonia	2.46	Chemicals and chemical products	3.22
Finland	2.17	Rubber and plastics	3.28
France	2.47	Non-metallic mineral products	3.47
Germany	3	Basic metals and fabricated metal	4.08
Greece	2.33	Machinery	4.76
Hungary	1.92	Electrical and optical equipment	5.93
Ireland	1.6	Transport equipment	3.08
Italy	1.77	Manufacturing, recycling	4.58
Netherlands	2.72	Electricity, gas and water supply	1.78
Norway	2.25	Construction	5.09
Poland	2.06	Motor trade and repair	2.67
Portugal	4.17	Wholesale trade	3.80
Slovak Republic	2.5	Retail trade	2.98
Slovenia	3.15	Hotels and restaurants	2.99
Spain	2.46	Transport and storage	3.35
Sweden	2.86	Post and telecommunications	4.16
Turkey	2.56	Financial intermediation	2.56
United Kingdom	1.12	Real estate activities	2.06
		Renting and business activities	4.19

Table A.5: Probit model : Self-rated health and job insecurity.

	Dependent variable : Dichotomized Self-Rated Health	
	Coeff	S.e
	(1)	(2)
Job insecurity	-.083***	(.018)
Age	-.028***	(.002)
Gender (Ref : Female)		
Male	.068*	(.040)
Education (Ref : Below secondary)		
Higher education	.352***	(.096)
Secondary education	.368***	(.087)
Occupation (Ref : Blue collars)		
Managers and professionals	.004	(.068)
Technicians and supervisors	.045	(.064)
White collars	.018	(.053)
Marital status (Ref : Does not live with a spouse-partner)		
Lives with a spouse-partner	-.003	(.038)
Difficulties to make ends meet	-.30***	(.039)
Period of unemployment immediately before this job	.081	(.061)
Presence of an employee representative	-.025	(.038)
Bad working condition index	-.070***	(.008)
Job pressure (Ref : High job pressure)		
Low job pressure	.287***	(.045)
Moderate job pressure	.126***	(.043)
Decision latitude (Ref : Low decision latitude)		
High decision latitude	.139	(.042)
Moderate decision latitude	.039	(.049)
Reward (Ref : Low reward)		
High reward	.483***	(.055)
Moderate reward	.296***	(.039)
Skill discretion	-.001	(.040)
Controls for country dummies	yes	yes
Controls for industry dummies	yes	yes
R-squared	.165	.165
Observations	8108	8108

Notes : (1) *** : significant at the 1% level, ** : significant at the 5% level, * : significant at the 10% level. (2) Robust standard errors in parentheses.

Table A.6: First stage regression.

	Dependent variable : Job insecurity	
	Coeff	S.e
	(1)	(2)
Sectoral US layoff rate*country-specific EPR	-.040**	(.016)
Age	-.001	(.001)
Gender (Ref : Female)		
Male	-.018	(.024)
Education (Ref : Below secondary)		
Higher education	.129**	(.063)
Secondary education	.086	(.060)
Occupation (Ref : Blue collars)		
Managers and professionals	.048	(.044)
Technicians and supervisors	-.012	(.038)
White collars	.013	(.036)
Marital status (Ref : Does not live with a spouse-partner)		
Lives with a spouse-partner	-.060***	(.021)
Difficulties to make ends meet	.238***	(.025)
Period of unemployment immediately before this job	.091**	(.042)
Presence of an employee representative	.014	(.022)
Bad working condition index	.008*	(.006)
Job pressure (Ref : High job pressure)		
Low job pressure	-.175***	(.028)
Moderate job pressure	-.108***	(.025)
Decision latitude (Ref : Low decision latitude)		
High decision latitude	-.120***	(.029)
Moderate decision latitude	-.055*	(.033)
Reward (Ref : Low reward)		
High reward	-.357***	(.031)
Moderate reward	-.144***	(.025)
Skill discretion	.026	(.025)
Controls for country dummies	yes	yes
Controls for industry dummies	yes	yes
R-squared	.158	.158
Observations	8108	8108

Notes : (1) *** : significant at the 1% level, ** : significant at the 5% level, * : significant at the 10% level. (2) Robust standard errors in parentheses.