Do employment protection policies reduce the relative disadvantage in the labour market experienced by unhealthy people? A natural experiment created by the Great Recession in Europe

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ABSTRACT

Unhealthy persons are more likely to lose their jobs than those who are healthy but whether this is affected by recession is unclear. We asked how healthy and unhealthy persons fared in labour markets during Europe's 2008–2010 recessions and whether national differences in employment protection helped mitigate any relative disadvantage experienced by those in poor health. Two retrospective cohorts of persons employed at baseline were constructed from the European Statistics of Income and Living Conditions in 26 EU countries. The first comprised individuals followed between 2006 and 2008, $n = 46{,}085$ (pre-recession) and the second between 2008 and 2010, $n = 85{,}786$ (during recession). We used multi-level (individual- and country-fixed effects) logistic regression models to assess the relationship (overall and disaggregated by gender) between recessions, unemployment, and health status, as well as any modifying effect of OECD employment protection indices measuring the strength of policies against dismissal and redundancy. Those with chronic illnesses and health limitations were disproportionately affected by the recession, respectively with a 1.5- and 2.5-fold greater risk of unemployment than healthy people during 2008–2010. During severe recessions (>7% fall in GDP), employment protections did not mitigate the risk of job loss (OR = 1.06, 95% CI: 0.94–1.21). However, in countries experiencing milder recessions (<7% fall in GDP), each additional unit of employment protection reduced job loss risk (OR = 0.72, 95% CI: 0.58–0.90). Before the recession, women with severe health limitations especially benefited, with additional reductions of 22% for each unit of employment protection (AOR_{female} = 0.78, 95% CI: 0.62–0.97), such that at high levels the difference in the risk of job loss between healthy and unhealthy women disappeared. Employment protection policies may counteract labour market inequalities between healthy and unhealthy people, but additional programmes are likely needed to protect vulnerable groups during severe recessions.

HIGHLIGHTS

- Employment protection reduced job loss risk before the recession and in mild recession.
- The difference in the risk of job loss between healthy and unhealthy women disappeared before the recession.
- In severe recessions employment protections did not mitigate the risk of job loss.
- Employment protection may counteract labour market inequalities.

INTRODUCTION

There has been widespread concern that the Great Recession that began in 2008 has disproportionately impacted vulnerable groups, particularly those with chronic illnesses or disabilities[1]. Historically, persons with chronic illnesses have been twice as likely to lose jobs than those in good health[2]. During previous recessions in Europe, men with chronic illness, particularly from lower socio-economic groups, were more likely to lose their jobs than men without chronic illness, leading many to exit the labour force entirely[3, 4]. Very few longitudinal analyses have examined this issue, but those that have consistently find that people who initially report poorer health were more likely to lose their jobs[5-8] – especially if they are older[9] – and then, when job loss occurs, to have more difficulty regaining work than those in better health[10]. Yet is it inevitable that economic downturns will heavily penalise those already disadvantaged on the grounds of health?

Cross-national variation in the extent to which chronically ill people are penalised in the labour market suggests that political and structural features of the labour market may protect them from any worsening of their existing disadvantage[11]. This political economy approach to health seeks to understand how politics, policies, and economics can influence the health and life chances of vulnerable groups, with potential implications for health inequalities[12-14]. It further draws attention to how recessions and employment protection legislation, two under-researched economic and political determinants of health, influence the relative disadvantage in the labour market experienced by those with chronic illnesses.

Employment protection legislation is intended to help protect jobs during hard times. Such legislation includes safeguards for permanent contracts as well as measures that make redundancy more expensive or difficult for employers. For example, requiring redundancies be approved by third party organisations makes lay-offs more difficult. Dismissal can also be made more costly if longstanding employees are entitled to greater severance pay. In such circumstances, employers may seek alternative ways to achieve savings rather than by shedding workers who may be perceived as less productive, particularly those in ill health, during economic contractions.

Although it is plausible that employment protection may reduce the short-term risk of job loss, the OECD and IMF claim that these policies lead to labour market rigidity, worsening overall employment rates[15, 16]. It is argued that firms may be reluctant to hire employees if it is difficult to dismiss them. U.S. studies that examined the short-term impact of the 1991 Americans with Disabilities Act, which prohibited workplace discrimination against disabled people, suggested that it exacerbated already high unemployment rates in this group[17, 18], with similar results observed in the UK[19]. Yet, others have suggested that these results were artefactual, since the Americans with

Disabilities Act increased the numbers of persons designated as disabled[20, 21]. Further studies that have investigated the longer-term effects find that anti-discrimination policies improved employment rates among disabled people although, in the UK, there is suggestive evidence that they have benefited men more than women[21-23]. These observations are thought to be a product of women's overrepresentation in precarious employment, including part-time work and the service sector. This debate reflects a growing concern with how politics and policies intersect with economic fluctuations in shaping population health[13].

In this study, drawing on the natural experiment created by the economic downturns in Europe that began to emerge in late-2007 following the collapse of the US housing bubble, we examine two questions concerned with the political economy of labour market inequalities:

1. Are unhealthy persons at greater risk of losing jobs than healthy persons during economic recessions?
2. Do employment protection policies mitigate their relative disadvantage during periods of (a) no recession, (b) mild recession, and (c) severe economic recession?

METHODS

Retrospective cohort data

Individual-level data were taken from the European Statistics of Income and Living Conditions (EU-SILC). We included data from individual surveys from 26 EU/EEA countries, apart from Germany in the years 2006–2010, Ireland in 2008–2010, Romania in 2006–2008 and Switzerland in 2006–2010 for which data were unavailable. Household response rates vary by country from 53.7% in Luxembourg to over 90% in Slovakia and Romania, with an overall mean response rate of over 80%.

The SILC survey includes both cross-sectional and longitudinal components. A rotational design is used for the longitudinal component, replacing 25% of the sample each year with a maximum coverage of four years. Thus, to assess the consequences for job loss, we constructed two cohorts of the longitudinal EU-SILC, covering the years 2006–2008 and 2008–2010. These cohorts were selected because they coincide with rising European unemployment associated with the Great Recession. Officially, recessions, defined in terms of declines in GDP, began in late 2007 and early 2008, but the subsequent increase in unemployment, which affected nearly all countries, began in 2009.

Persons in the first cohort (prior to large rises in unemployment associated with the Great Recession) were employed in 2006 and were interviewed annually until 2008. Members of the second cohort (during the rise in unemployment) were employed in

2008 and interviewed annually until 2010. Members of both cohorts were included in the EU longitudinal sample if they were present throughout the three-year study phases (covering 2006–2008 and 2008–2010) and did not exit the workforce (i.e. retired, were unable to work due to disability, were in full-time education or otherwise inactive). This yielded a final analytic sample of 46,085 respondents in 2006–2008 (138,255 person-years) and 85,786 respondents in 2008–2010 (257,358 person-years).

Multi-level statistical models

Becoming unemployed is our outcome of interest. To measure the incidence of unemployment, a dummy variable was created for respondents who self-reported unemployment in any or both of the 2 years from baseline. We define job loss as becoming unemployed and remaining economically active. Unemployment is defined as 'current' economic activity and so the SILC data may fail to capture those who were employed during the data collection period in 2006 and in 2007 but who were briefly unemployed between these two periods.

Chronic illness and health limitation are both key explanatory variables. Chronic illness was defined as the presence of self-reported long-term conditions (No = 0, Yes = 1). We also evaluated the presence of health conditions severely limiting daily activities (henceforth heath limitations) (No limitation = 1, Some limitation = 2, Severe limitation = 3), although small numbers did not allow for within-country comparisons. Item non-respondents were removed from our sample for chronic illness (2008 $n = 6022$; 2010 $n = 11,618$) and for limiting health conditions (2008: $n = 6032$; 2010: $n = 11,635$).

Our models also include individual- and country-level covariates. Because chronic illnesses and heath limitations are highly correlated with age, we include both measures of age and age-squared to adjust for any non-linear associations with the probability of job loss. We also adjust for marital status (married or not) and educational status (measured as the number of years of educational attainment) as both may moderate the association between economic activity and health status. We also adjust for a series of macroeconomic variables that might explain variation in the pressures in the labour market to which both healthy and unhealthy employees are exposed. These country-level variables include Gross Domestic Product (GDP) as a measure of the wealth of a country while the change in GDP captures the depth of the recession. Both of these are adjusted for inflation and purchasing-power. Unemployment rates measure pre-existing pressure in the labour market while the change in unemployment captures the population wide change in employment rates due to the crisis.

To assess whether persons in ill-health were at greater risk of job loss before and during the Great Recession, we fit a logistic regression model with standard errors adjusted for within-country clustering, as follows:

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1) $\text{Job loss}_{i,j,k,t} = \beta_0 + \beta_1\text{Ill}_{i,j,k\text{ baseline}} + \beta_2\text{Age}_{i,j,k,t} + \beta_3\text{Age}^2_{i,j,k,t} + \beta_4\text{Marital}_{i,j,k,t} + \beta_5\text{Educ}_{i,j,k,t} + \beta_6\text{GDP}_{k,t} + \beta_7\Delta\text{GDP}k,t + \beta_8\text{UE}_{k,t} + \beta_9\Delta\text{UE}_{k,t} + a_i + \varepsilon_{i,j,k,t}$

Here i is individual, j is sex, k is country, and t is year. Job loss is 1 if person i became unemployed since being employed at baseline; Ill is either the measure of self-reported chronic illness or the measure of health limitations at the base year. a_i is the person-specific fixed-effect, which adjusts for time-invariant covariates. Marital is a person's marital status, and Educ is the person's number of years of educational attainment; GDP is gross domestic product and UE measures the unemployment rate while ΔGDP and ΔUE represent the annual change in both of these same measures; ε is the error term. We estimated the models across all individuals and for men and women separately.

Given eq. (1), we then assessed two potential exacerbating or mitigating factors. First we asked whether the risk of job loss was greater during more severe recessions. We compared the risk of job loss in countries experiencing severe recession with those experiencing either a mild recession or no recession at all. Countries with a recession greater than the median downturn (cumulative GDP decline ≥7%) were defined as 'severe' and 'mild' recessions were those countries below the median (<7% of GDP). Data from 2006 to 2008 are coded as 'no recession', since all countries in the sample experienced GDP growth over this period.

Second, we asked whether stronger employment protection could reduce the risks of job loss. To do so we included the OECD measures of the strength of legislation protecting employees from both collective and individual dismissal in the statistical models. Box 1 provides a detailed description of the OECD employment protection indicators[16]. Our combined measure of employment protection is on a continuous scale from 0 (lowest protection) to 2.5 (highest protection). At the lowest levels were countries such as the UK and Denmark, and at the highest were Italy, Luxembourg and Sweden. Data on employment protection were missing from Bulgaria, Cyprus, Latvia, Lithuania, and Malta. Potential protective effects were tested using both a direct effect of each additional unit of employment protection and a modifying effect using an interaction term for health status and each additional unit of employment protection.

2) $\text{Job loss}_{i,j,k,t} = \beta_0 + \beta_1\text{Ill}_{i,j,k\text{ baseline}} + \beta_2\text{Protect}_{k,t} + \beta_3\text{Protect } x \text{ Ill}_{i,j,k,t} + \beta_a X_{i,j,k,t} + \beta_\beta Z_{k,t} + a_i + \varepsilon_{i,j,k,t}$

Again i is individual, j is sex, k is country, and t is year. Job loss is 1 if person i became unemployed since being employed at baseline; $\beta_a X$ is a vector of individual-level covariates described in eq. (1) and $\beta_b Z$ is a vector of country-level covariates also described in eq. (1). Protect is a measure of employment protect legislation and Protect x Ill is an interaction term between an individual-level measure of health status and a country-

level measure of employment protection. This interaction term tests whether unhealthy or healthy employees are the greatest beneficiaries of this type of national legislation. Tables 1 and 2 provide descriptive statistics for all variables used in the analysis.

All statistical models were weighted to account for the clustered, multi-stage sampling design. Models were also weighted by country population size, to be representative of the EU, although the results were not sensitive to this coding decision. Analyses were performed using Stata/IC 12.1.

Box 1. OECD Employment Protection Indices

Employment protection against dismissal includes two components: legislation protecting permanent workers against individual dismissal and specific requirements for collective dismissal.
Individual dismissal
The measure of strictness captures three aspects of the procedure of individual dismissal:
1.   Procedural inconveniences,
2.   Notice periods and severance pay, and
3.   Difficulty of dismissal (including repercussions for unfair dismissal).
Collective dismissal
Most countries impose additional requirements when an employer dismisses a large number of workers. These measures incorporate 4 components:
1.   The definition of 'collective dismissals', e.g., more than 50 dismissals,
2.   How many actors (e.g., employee representatives or government authorities) need to be notified,
3.   Additional delays over and above the delays required for individual dismissal, and Additional severance pay requirements over and above those required by individual dismissals[16].

RESULTS

Those who have health limitations or a chronic illness are more likely to be unemployed than those without poor health (Difference in means = 2.86 percentage points, t (df = 88603) = 10.58, $p < 0.001$) (Figure 1). Between 2005 and 2011, unemployment rates were on average 25.3% in persons with severe health limitations, 13.7% in persons with chronic illnesses, and 9.29% in persons who were healthy (i.e. no chronic illnesses or health limitations). During the post-recession years 2009 and 2011, unemployment rates among those with health limitations rose by 4.08 percentage points ($p < 0.001$) and only 2.14 percentage points ($p < 0.001$) points among those with no health limitations, widening the gap between healthy and unhealthy persons.

To address the possibility that people were ill because they were unemployed (a selection bias), we then evaluated a baseline of persons who were employed in 2006 and 2008. This sub-sample also showed that 4.16% of persons with health limitations lost jobs, 3.39% of persons with chronic illnesses lost jobs, but only 2.82% of healthy persons lost their jobs. We now look in detail at the association between different health states and job loss, adjusting for potential confounding factors.
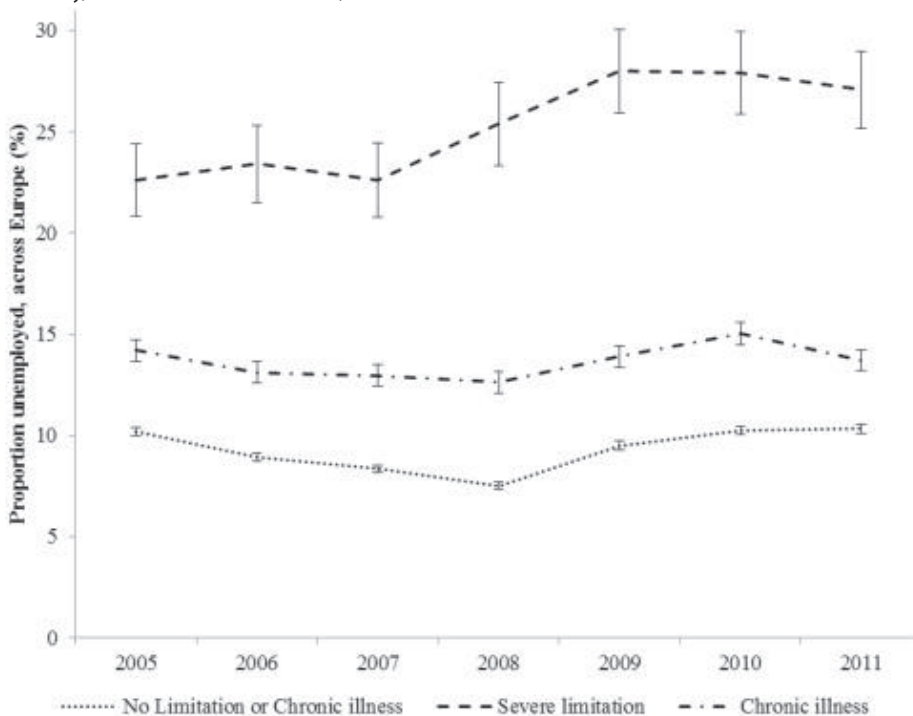
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Table 1. Descriptive statistics for individual level variables, 2006–2010

Individual level	Pre-recession cohort			Recession cohort		
	2006 (Baseline)	2007	2008	2008 (Baseline)	2009	2010
Lost work						
Employed	46,085 (100%)	45,090 (97.8%)	44,830 (97.3%)	85,786 (100%)	82,424 (96.1%)	81,242 (94.7%)
Unemployed	0 (0%)	995 (2.16%)	1255 (2.72%)	0 (0%)	3362 (3.92%)	4544 (5.30%)
Age	40.9	41.9	42.9	40.9	41.9	42.9
Sex						
Male	25,537 (55.4%)	25,537 (55.4%)	25,537 (55.4%)	47,120 (54.9%)	47,120 (54.9%)	47,120 (54.9%)
Female	20,548 (44.6%)	20,548 (44.6%)	20,548 (44.6%)	38,663 (45.1%)	38,663 (45.1%)	38,663 (45.1%)
Marital status						
Married	29,477 (64.1%)	29,906 (64.9%)	30,205 (65.6%)	54,665 (63.8%)	55,224 (64.5%)	55,747 (65.1%)
Not married	16,491 (35.9%)	16,150 (35.1%)	15,855 (34.4%)	31,049 (36.2%)	30,457 (35.6%)	29,938 (34.9%)
Education						
Pre-primary	104 (0.23%)	97 (0.21%)	112 (0.24%)	180 (0.21%)	184 (0.22%)	197 (0.23%)
Primary	3249 (7.1%)	3294 (7.21%)	3231 (7.05%)	5080 (5.95%)	4966 (5.82%)	4905 (5.75%)
Lower secondary	6331 (13.8%)	5962 (13.1%)	6128 (13.4%)	12,084 (14.2%)	12,055 (14.1%)	12,073 (14.2%)
Upper secondary	21,419 (46.8%)	21,464 (47.0%)	21,372 (46.6%)	40,418 (47.4%)	40,088 (47.0%)	39,929 (46.8%)
Post-secondary non-tertiary	1879 (4.11%)	1955 (4.28%)	1859 (4.05%)	3296 (3.86%)	3456 (4.05%)	3291 (3.86%)
Tertiary education	12,759 (27.9%)	12,924 (28.3%)	13,152 (28.7%)	24,272 (28.4%)	24,574 (28.8%)	24,928 (29.2%)
Chronic illness						
No chronic illness	32,844 (82.0%)			60,995 (82.2%)		
Chronic illness	7219 (18.0%)			13,173 (17.8%)		
Limiting health condition						
Not limited	35,278 (88.1%)			65,623 (88.5%)		
Limited	3957 (9.88%)			7250 (9.78%)		
Strongly limited	818 (2.04%)			1278 (1.72%)		

Notes: Source: EU-SILC

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Table 2. Descriptive statistics for population-level variables, 2006–2010

Variable	Description	2006–2008		2008–2010		Source
		N countries	Mean (Std. Dev)	N countries	Mean (Std. Dev)	
OECD Employment protection index	Combined measure of protection against dismissal and around permanent employment	21	1.42 (0.72)	19	1.42 (0.72)	OECD Employment database
GDP	Per capita, adjusted for inflation and purchasing-power	27	24661.4 (12333.8)	27	24218.2 (12028.3)	EuroStat
Annual change in GDP	Per capita, adjusted for inflation and purchasing-power	27	715.8 (881.9)	27	−327.3 (1111.5)	EuroStat
Unemployment rate	% of the labour force	26	6.43 (2.25)	26	8.28 (3.97)	EuroStat
Annual change in the unemployment rate	Percentage point change in the unemployment rate	26	−0.62 (1.10)	26	1.28 (2.12)	EuroStat

Figure 1. Proportion unemployed by whether respondent has a severely limiting illness, chronic illness, or is healthy, EU-SILC cross-sectional data, 2005–2011

Notes: Source: EU-SILC Cross-sectional data, 2005-2011. Weighted estimates across Europe calculated by year. Vertical bars represent 95% confidence intervals.

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Effect of recessions on job loss in persons with different health states

First we look at the pooled associations between health limitations, chronic illness and job loss during the recent economic recessions in Europe.

Table 3 compares the risks of job loss in persons with either a limiting health status or a chronic illness to those without, adjusting for age, education, marital status, and other possible confounding socio-economic factors. In 2008–2010, men and women with severe health limitations were significantly more likely to experience job loss than those without limitations (AOR_{men} = 1.70, 95% CI: 1.09 to 2.64 and AOR_{women} = 1.74, 95% CI: 1.21–2.51). Similarly, prior to the recessionary period, in 2006-8, women with severe health limitations were more likely to lose their jobs than those without (AOR_{women} = 3.42, 95% CI: 2.27–5.15) but not men (AOR_{men} = 0.65, 95% CI: 0.25–1.69). Similar patterns were observed for those with chronic illness (see Table 3). As the results for job loss are similar for those with health limitations and chronic illness, in the remainder of the paper we focus on the latter, as the sample sizes are larger.

Table 3. Job loss risks in persons with and without a limiting illness among persons employed at baseline, before the Great Recession 2006–2008 and during it 2008–2010

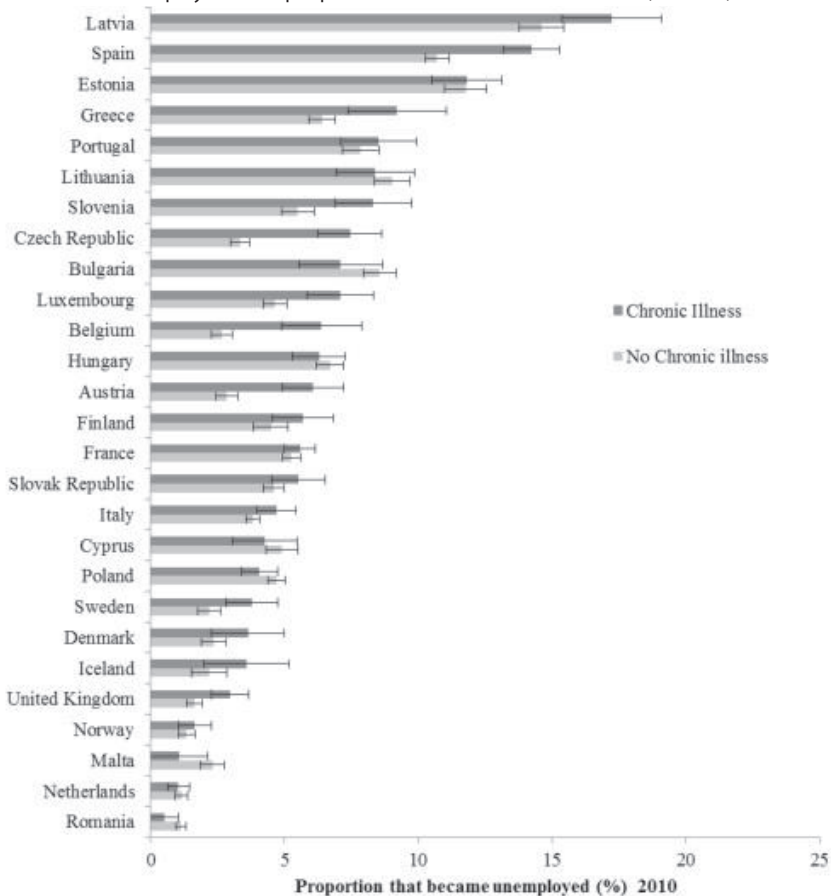| | Odds of job loss | | | | | |
| | 2006–2008 (Prior to recession) | | | 2008–2010 (During the recession) | | |
Health limitation	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
No limitation	Reference	Reference	Reference	Reference	Reference	Reference
Some limitation	1.16	0.69	1.54**	1.34**	1.55**	1.14
	(0.88–1.52)	(0.35–1.37)	(1.26–1.88)	(1.17–1.53)	(1.42–1.70)	(0.89–1.46)
Severe health limitations	1.87**	0.65	3.42**	1.71**	1.70*	1.74**
	(1.63–2.15)	(0.25–1.69)	(2.27–5.15)	(1.51–1.94)	(1.094–2.64)	(1.21–2.51)
Number of persons employed at baseline	38,620	21,409	17,211	70,603	38,555	32,047
Number of countries	26	26	26	25	25	25
	2006–2008			**2008–2010**		
Chronic illness	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
No chronic illness	Reference	Reference	Reference	Reference	Reference	Reference
Chronic illness	1.15**	0.79	1.53**	1.29**	1.30*	1.28**
	(1.07–1.24)	(0.58–1.08)	(1.37–1.70)	(1.09–1.52)	(1.04–1.64)	(1.16–1.41)
Number of persons employed at baseline	38,629	21,415	17,214	70,604	38,568	32,035
Number of countries	26	26	26	25	25	25

Notes: Data on limitation in activities due to health problems refer to self-reported evaluations of the extent to which they are limited in activities people usually do because of health problems for at least the last 6 months. Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age^2, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), change in unemployment rate (% of the labour force). All individuals are employed in the base year of either 2006 or 2008. Standard errors are clustered at the country-level.
*$p < 0.05$, **$p < 0.01$.

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Comparing effects during severe, mild, and no recession

Were these risks of job loss for persons with chronic illness inevitable during periods of recession? As shown in Figure 2, there were marked cross-national variations in the disparities in unemployment rates across European nations between healthy and un-healthy persons for the year 2010. In Norway, there was virtually no employment gap: rates were 2.00% in healthy persons and only slightly higher, at 2.24%, in persons with chronic illness. In contrast, in Latvia, there was a substantial absolute disparity, with rates of 19.7% and 23.6% for these groups, respectively. Austria was an intermediate case, where although unemployment rates were lower, there was also a substantial gap, with unemployment rates about 5% in healthy persons but over 10% in persons with a chronic illness.

Figure 2. Onset of unemployment for people with and without a chronic illness, EU-SILC, 2008–2010

Notes: Source: EU-SILC, longitudinal panel. Unemployment rate among those who self-report a chronic illness or not. Error bars represent 95% confidence intervals.

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One factor possibly accounting for these stark differences is the severity of the economic recession. In a more severe recession, employers may need to make large-scale redundancies, disproportionately concentrated among persons with health limitations. To test this possibility, we stratified the association of job loss and chronic illness by the magnitude of each EU country's recession (as measured by cumulative declines in GDP between 2007 and 2010). We coded large recessions as greater than the median downturn (cumulative GDP decline ≥7%) and small recessions as below the median (<7% of GDP).

Tables 4 and 5 show the results of the multi-level statistical models, stratified by the severity of recessions. In countries experiencing large recessions, those with chronic illnesses were considerably more likely to lose their jobs than healthy persons (AOR = 1.66, 95% CI: 1.57–1.76). These effect sizes were significant, but attenuated in countries with milder recessions (AOR = 1.13, 95% CI: 1.07 to 1.19; test of effect homogeneity: $\chi^2(1) = 82.31$, $p \leq 0.001$) and were similar in magnitude to those found during the pre-recession period (AOR = 1.14, 95% CI: 1.06–1.23) (Table 4). Similar results were observed for those with severe health limitations (Table 5).

Mitigating role of employment protections during severe, mild, and no recession

It is possible that stronger employment protection can mitigate the risk of job loss faced by unhealthy persons during recessions. To test this hypothesis, we include the OECD index of employment protections into the statistical models.

Table 4 shows the results of the multi-level statistical models. In severe recessions, each additional unit of the OECD employment protection index was not associated with the risk of job loss (Pooled AOR = 1.06, 95% CI: 0.94–1.21). However, in milder recessions, we found that each additional unit of employment protection was associated with a 28% lower likelihood of job loss for all persons (Pooled AOR = 0.72, 95% CI: 0.58–0.90), as shown in Table 4. When there was no recession, as in the pre-recession years, each additional unit of employment protection was also found to lower significantly the risk of job loss (Pooled AOR = 0.77, 95% CI: 0.64–0.94) (Table 4).

Next we examine whether there is an additional protective effect of these employment policies for persons in poor health compared to health employees. Employment protection legislation appeared to bring the greatest benefit to women with chronic illness (rather than men), resulting in an additional 22% reduction in job loss risk (AOR = 0.78, 95% CI: 0.62 to 0.97, $p = 0.024$; Table 6). Yet, this additional protective effect for unhealthy women is only observable prior to the onset of the recession. For men, there is no clear difference between the healthy and unhealthy in terms of their risk of job loss both before and during the economic crisis. Using Seemingly Unrelated Estimation we formally test for potential effect heterogeneity by sex (i.e. whether coefficients significantly differed

Table 4. Job loss risks in persons with and without a chronic illness in severe, mild, and no recession

	Odds ratio of job loss		
	2008–2010		
	Total	**Male**	**Female**
Severe recession			
Person has a chronic illness	1.66** (1.57–1.76)	1.76** (1.58–1.96)	1.48** (1.26–1.75)
Each unit of OECD employment protection	1.06 (0.94–1.21)	0.95 (0.89–1.01)	1.24 (0.98–1.58)
Number of persons employed at baseline	27,865	15,516	12,348
Number of countries	9	9	9
	Total	**Male**	**Female**
Mild recession			
Person has a chronic illness	1.13** (1.07–1.19)	1.07 (0.99–1.15)	1.22** (1.15–1.30)
Each unit of OECD employment protection	0.72** (0.58–0.90)	0.63** (0.46–0.89)	0.89 (0.72–1.09)
Number of persons employed at baseline	29,875	16,043	13,834
Number of countries	10	10	10
	2006–2008		
	Total	**Male**	**Female**
No recession			
Person has a chronic illness	1.14** (1.06–1.23)	0.78 (0.57–1.06)	1.53** (1.36–1.71)
Each unit of OECD employment protection	0.77** (0.664–094)	0.73* (0.57–0.93)	0.84* (0.71–0.99)
Number of persons employed at baseline	34,263	19,078	15,185
Number of countries	21	21	21

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate. All individuals are employed in the base year of 2008. Countries are described as 'high recession' if, between 2007 and 2010, the cumulative decline in GDP was greater than the median decline (~7%). All other countries are described as low recession. High recession countries include: Croatia, Czech Republic, Estonia, Finland, France, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Slovenia, Spain, Sweden, and United Kingdom. Standard errors are clustered at the country-level.
*$p < 0.05$, **$p < 0.01$.

across models). Our tests indicated that chronically ill women benefited from employment protection to a significantly greater extent than did men (χ^2 (1): 5.57, $p = 0.02$). This interaction effect indicates that labour market inequalities between unhealthy and healthy persons are reduced when employment protection policies are present.

To put these findings into perspective (Table 6), Figure 3a and b illustrate the overall impact of employment protection on women with ill health. Figure 3a shows that a higher level of employment protection reduced the risk of job loss for women with and without chronic illness but to a much greater extent for those with chronic illness. In countries with the lowest degree of employment protection, women with chronic illness have a 6.50% risk of job loss (95% CI: 5.24%–7.76%) compared with 3.54% in those

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Table 5. Job loss risks in persons with and without a health limitation in severe, mild, and no recession

	Odds ratio of job loss		
	2008–2010		
	Total	Male	Female
Severe recession			
Person has a severe health limitation	1.33 (0.99–1.78)	0.75 (0.44–1.29)	2.70** (1.50–4.85)
Each unit of OECD employment protection	1.03 (0.92–1.16)	0.91** (0.87–0.97)	1.22 (0.96–1.55)
Number of persons employed at baseline	27,853	15,501	12,351
Number of countries	9	9	9
	Total	Male	Female
Mild recession			
Person has a severe health limitation	1.81** (1.69–1.95)	2.13** (1.80–2.51)	1.45** (1.22–1.73)
Each unit of OECD employment protection	0.73** (0.59–0.89)	0.64** (0.47–0.89)	0.88 (0.70–1.09)
Number of persons employed at baseline	29,886	16,042	13,844
Number of countries	10	10	10
	2006–2008		
	Total	Male	Female
No recession			
Person has a severe health limitation	1.89** (1.65–2.18)	0.65 (0.25–1.72)	3.51** (2.37–5.19)
Each unit of OECD employment protection	0.77** (0.63–0.93)	0.73* (0.57–0.94)	0.83* (0.70–0.97)
Number of persons employed at baseline	34,254	19,074	15,180
Number of countries	21	21	21

Notes: Data on severely limiting illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a severely limiting illness or condition. All models control for age, age-squared, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate. All individuals are employed in the base year of 2008. Countries are described as 'high recession' if, between 2007 and 2010, the cumulative decline in GDP was greater than the median decline (~7%). All other countries are described as mild recession. Severe recession countries include: Croatia, Czech Republic, Estonia, Finland, France, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Slovenia, Spain, Sweden, and United Kingdom. No recession observations are from the pre-recession period. Standard errors are clustered at the country-level.
*$p < 0.05$, **$p < 0.01$.

without chronic illnesses (95% CI: 2.96%–4.11%) ($p < 0.001$). As employment protection increases, not only does the probability of losing work go down, but it declines fastest for women with chronic illness until the differences between persons with and without these conditions become statistically indistinguishable ($p = 0.94$). Similar patterns were observed when evaluating the risks associated with health limitations (Figure 3b).

Robustness checks

Models were adjusted for individual fixed-effects; however, in a robustness check we also adjusted for country-specific differences. None of the results qualitatively changed (see Appendix A, Text S2). Since the likelihood of chronic illness increases non-linearly

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Table 6. Effect modification of employment protection policies on persons with and without chronic illness

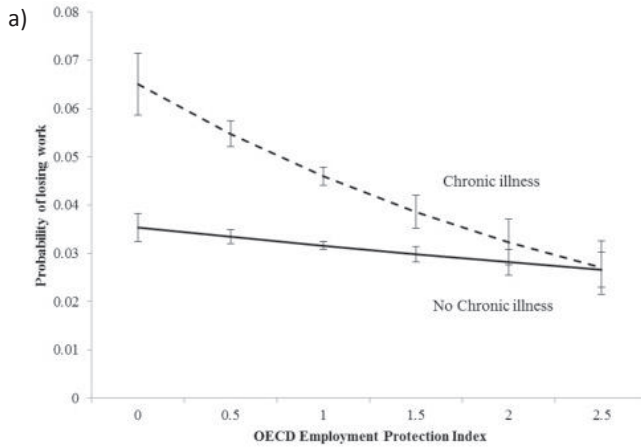|	Odds ratio of job loss		
	2006–2008		
	Total	**Male**	**Female**
Chronic illness			
Direct effect of employment protection for persons without a chronic illness	0.78** (0.64–0.93)	0.69** (0.53–0.89)	0.89 (0.75–1.06)
Modifying effect of employment protection for persons with a chronic illness	1.04 (0.84–1.29)	1.50 (0.94–2.39)	0.78* (0.62–0.97)
Number of individuals	34,263	19,078	15,185
Number of countries	21	21	21
	Total	**Male**	**Female**
Health limitation			
Direct effect of employment protection for persons without a severe health limitation	0.76** (0.62–0.92)	0.69** (0.54–0.90)	0.84 (0.70–1.01)
Modifying effect of employment protection for persons with a severe health limitation	0.79 (0.53–1.18)	1.89 (0.66–5.44)	0.53* (0.30–0.93)
Number of persons employed at baseline	34,254	19,074	15,180
Number of countries	21	21	21

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate, and whether respondent has a chronic illness. All individuals are employed in the base year of 2008. Employment protection is an average of the employment protection scores for dismissal and permanent work. Effect sizes are based on modeling the interaction between whether respondents have a chronic illness or not (Chronic illness = 1) and the level of employment protection: $\beta1 \times$ Chronic Illness + $\beta2$Chronic Illness $\times$ Employment Protection + $\beta3$*Employment protection. Standard errors are clustered at the country-level.
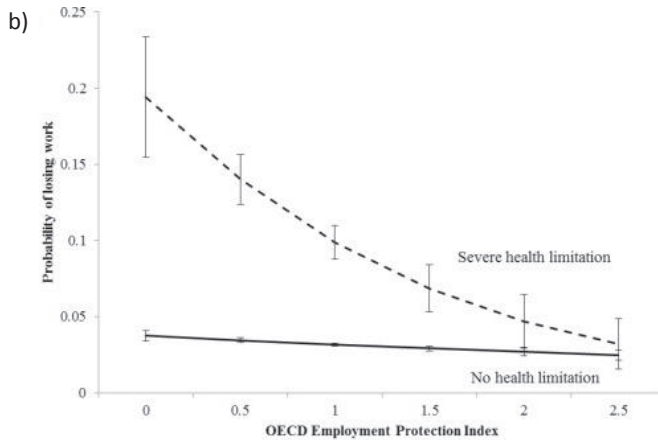*$p < 0.05$, **$p < 0.01$.

with age, we further disaggregated our models into persons below and above age 40. Consistent with our previous models, we find that women with chronic illnesses in both age cohorts were more likely to become unemployed in the pre-recession period than those without (see Appendix A, Text S3). Because women with chronic illness may occupy more vulnerable positions in the labour market, especially in countries where female labour market participation is low, we added an adjustment for each country's degree of gender labour-market equality, which includes female labour force participation rates, from the World Economic Forum. Again, our results were not significantly altered, as shown in see Appendix A, Text S4. We also re-ran the models using educational attainment as a categorical variable, without substantive changes to the results (see Appendix A, Text S5). Nor did weighting by each country's population size qualitatively affect our findings (see Appendix A, Text S6).

By selecting only those who are employed in the first wave, the analytic sample may exclude those most likely to lose their jobs in subsequent periods. For example, men

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Figure 3. a) Job loss risk and employment protection policy for women with and without a chronic illness, before the Great Recession in 2006–2008. b) Job loss risk and employment protection policy for women with and without health limitation, before the Great Recession in 2006–2008

a)

Notes: All models control for age, age^2, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), change in unemployment rate (% of the labour force). Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. Vertical bars represent 95% confidence intervals. Standard errors are clustered at the country-level. OECD employment index is taken from the Employment database, 2013 edition.

b)

Notes: Data on limitation in activities due to health problems refer to self-reported evaluations of the extent to which they are limited in the activities people usually do because of health problems for at least the last 6 months. All models control for age, age^2, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), change in unemployment rate (% of the labour force). Vertical bars represent 95% confidence intervals. Standard errors are clustered at the country-level. OECD employment index is taken from the Employment database, 2013 edition.

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with chronic illness may be less likely to 'become unemployed' because they were economically inactive in the first place (especially older men). Descriptive statistics suggest that women are more likely to report a chronic illness and they are less likely to be involved in the labour market than men, even among men and women over 50. For example, 32.1% of women self-report a chronic illness compared with 28.0% of men. To formally test whether there is a selection effect we use a probit Heckman selection model, which estimates the likelihood of being in employment in 2006 given the presence of poor health (first-stage) and then uses the outcome of this model to adjust the influence of poor health on becoming unemployed given they were employed in 2006. As anticipated, these models suggest that adjusting for selection into employment does not substantially influence our results, for men or women (see Appendix A, Text S7). Finally, job loss may involve other states of economic inactivity rather than becoming unemployed. To ensure our results are consistent for those who become unemployed and those who exit the labour market, we re-estimated our models using both unemployment and economic inactivity as our measure of job loss. Results are slightly attenuated but broadly consistent; for example, Fig. S1 in Appendix A, shows that chronically ill women are less likely to experience job loss (either unemployment or exiting the labour market) in countries with high levels of employment protection.

DISCUSSION

Our study finds that, during Europe's Great Recessions, unhealthy persons have been at greater risk of extended periods of unemployment, albeit the extent to which they have experienced this risk varied depending on the economic (i.e., severity of recession) and political (e.g., level of employment protection) context.

   In nations experiencing severe recessions, the consequences have been worst where employment protection policies offer little or no protection in situations where firms shed large numbers of jobs. However, employment protection policies were able to mitigate, and at high levels of protection, to eliminate, the disadvantages experienced by those in ill health in countries facing less severe economic contractions or no recession at all[24]. In short, employment protection policies mitigate labour market inequalities during periods of (a) no recession and (b) mild recession but not during (c) severe recessions. The question arises as to whether these associations are causal. They do meet many of Bradford Hill's criteria of causality, such as specificity and the presence of a clear gradient indicative of a dose-response relationship (especially with respect to women). Taken together, these findings reinforce the importance of the social determinants and, in particular, the political economy of health.

Yet, why are employment protection legislations less protective during severe economic recessions? First, if workers in the second cohort are healthier than the first cohort then firms may be forced to lay off healthy workers irrespective of employment protection legislation. Yet, 18.0% and 17.8% of those employed in 2006 and 2008, respectively, had a chronic illness suggesting that the 2008 cohort were not 'healthier', on average, than the 2006 cohort. Further, rises in unemployment associated with the Great Recession did not occur across Europe until 2009, suggesting that a 'healthy worker effect' is unlikely to explain these results. Second, mass layoffs, which tend to be less health selective, are more common during severe recessions[25]. While employment protection may constrain mass layoffs they would not protect unhealthy employees in the event of a closure of a firm. Hence, in periods of higher levels of mass layoffs, employment protections may fail to offer additional protection to the already disadvantaged[26]. Firm closure has risen during the Great Recession and this rise is likely to have been largest in the countries with the deepest recessions, where the role of employment protection is therefore diminished[25, 27].

Third, although all EU Member States have adopted some form of anti-discriminatory legislation, designed to protect people with disabilities in compliance with the relevant EU Directive, in practice Member States have implemented the Directive's provisions to varying degrees[28]. Evidence suggests that these policies have sometimes had limited ability to protect those with poor health from labour market penalties[29] and this may reflect a low degree of compliance. At the beginning of the crisis, in 2008, only 14% of Spanish firms with more than 50 workers met quotas for employing disabled persons[30]. Similarly, in France, 90% of eligible employers failed to meet the legal quota, and about one-third had no disabled employees at all[24]. Further, should employers view compliance as optional during stable economic periods[24], then it is more likely that such regulations will be flouted when consumer demand declines in recessions [31]. In France, for example, the number of claims of potential labour market discrimination based on disability doubled between 2007 and 2008[24]. Given previous studies that imply that there may be less selection on health during periods when job loss is high, further research is needed to understand the reasons why employment protections have failed to protect employment status of vulnerable groups during the recent economic crisis[32]. Both the rise in mass layoffs and limited (and potentially declining compliance) may explain why employment protections failed to protect vulnerable groups in severe recessions.

As with all analyses using survey data, our study has several limitations. First, our analysis cannot ascertain the conscious or sub-conscious motivations of employers that lie behind the increasing tendency to dismiss workers suffering ill health. However, our results do indicate that they are much more prone to do so during recessions. Second, while the longitudinal data document clearly that women were more likely to lose jobs

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during non-recessionary periods, consistent with other evidence from Europe[21-23], we were unable to disaggregate different economic sectors that may account for these gendered patterns, such as the traditionally female service industries. Similarly, we are unable to ascertain why men with poor health have become more likely to lose work during the crisis but the most likely explanation is the differential impact of the crisis on sectors dominated by men, for example construction and manufacturing sectors. Third, item non-response could potentially influence our results. Non-respondents were younger than respondents but had similar levels of education (see Appendix A, Text S7). As such, non-respondents were less likely to have long-standing limiting health conditions and chronic illnesses. However, the proportion of non-respondents is so small (e.g., 0.6% of the available sample with a chronic illness) that the impact of non-response in this instance would likely be minimal.

Fourth, our measure of economic status fails to capture all spells of unemployment between data collection periods and is therefore unable to observe short-term fluctuations in economic activity. Without these data it is difficult to assess whether unhealthy persons have struggled to re-enter the labour market more than healthy individuals. Fifth, not all forms of chronic illness may limit working ability, such as type 1 or 2 diabetes or high blood pressure. This measurement error in the association between chronic illness and job loss will likely lead to conservative estimates and may also explain why the results were stronger for those persons reporting severe health limitations. Exploring this more fully with appropriate data would be an important avenue for future research. Finally, our measure of worker protection from dismissal focused on the entirety of the labour force, rather than specifically on persons in ill health. This limitation would have likely attenuated the observed protective associations of worker protections, making it more difficult to identify an effect should one exist.

The novel contributions of this study are its ability to highlight how macro-social factors, such as policy and economics, shape individual life chances, which in turn influence health inequalities. Specifically, we differentiate the employment trajectories of people with poor health in times of financial stability and in recessions, and we assess the impact of labour market policies on those trajectories. This political economy approach also demonstrates that employment protection policies, by reducing the extent to which chronically ill persons experience disadvantage in the labour market, increase the resilience of this group to economic shocks. For these groups, navigating a financial crisis without experiencing poorer health is, in part, contingent on whether there are strong employment protection policies in place[13, 33].

Our results have immediate implications for policy, pointing to an urgent need to either strengthen anti-discrimination policies so that they work effectively or identify alternative protective policies for persons in ill health who occupy vulnerable positions in the labour market during times of economic hardship. This is particularly important

in those countries implementing further deep austerity measures to reduce public sector employment, such as Greece and Spain, where these redundancies may further exacerbate already high risks of job loss for both men and women living with chronic illnesses and disabilities.

In 2013 the IMF and OECD recommended that Greece, Spain, and other crisis-stricken nations implement 'supply-side' reforms, making it easier to fire people, reflecting their belief that this would increase employment and boost future economic growth[34]. Our results suggest that such a policy to withdraw employment protections in pursuit of flexible labour markets is likely to increase the risk of job loss in persons with health limitations and chronic illnesses disproportionately and thus be indirectly discriminatory. Further work would be needed to assess how such programmes affect the likelihood of reintegration into the labour market of persons who have already lost jobs. Because job loss also worsens mental health[35-37], persons with chronic illnesses and health limitations are in danger of becoming ensnared in a vicious cycle of poor health and unemployment.

CONCLUSION

Unhealthy persons are at greater risk of job loss than healthy persons during economic recession; yet, the disadvantages of unhealthy persons in the labour market vary among countries. We find that where employment protection legislation is strong, i.e., where the costs of both collective and individual dismissal are high, the gap in the probability of job loss between unhealthy and healthy persons is diminished; and, before the recession, it is entirely removed for women. However, this protective effect of employment policies is observed primarily during periods of no recession or moderate recessions and not during severe economic downturns (decline in GDP > 7%). In contrast to recent recommendations from the OECD and the IMF to relax employment protection, these findings suggest that strengthening such legislation and ensuring compliance may make these vulnerable groups more resilient to future economic shocks.

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CHAPTER 3. SUPPLEMENTARY DATA

Text S1. Job loss risks in persons with a chronic illness among persons adjusting for country 'fixed-effects', before the Great Recession 2006-2008 and during it 2008-2010

	Odds ratio of Job Loss					
	2006-2008			2008-2010		
	Total	Male	Female	Total	Male	Female
Person has a chronic illness	1.14** (1.06 to 1.22)	0.77 (0.58 to 1.04)	1.53** (1.37 to 1.70)	1.26** (1.07 to 1.48)	1.26* (1.01 to 1.56)	1.27** (1.15 to 1.39)
Number of individuals	38,629	21,415	17,214	70,604	38,568	32,035
Number of countries	26	26	26	25	25	25

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, educational attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate. All individuals are employed in the base year of either 2006 or 2008. Models also control for country-specific differences, so called country 'fixed-effects'. Standard errors are clustered at the country-level. * $p < 0.05$, ** $p < 0.01$

Text S2. Job loss risks in persons with a chronic illness among persons disaggregating by age, before the Great Recession 2006-2008 and during it 2008-2010

	Odds ratio of Job Loss					
	2006-2008			2008-2010		
Age <= 40	Total	Male	Female	Total	Male	Female
Person has a chronic illness	0.92 (0.74 to 1.16)	0.53 (0.21 to 1.32)	1.51** (1.11 to 2.04)	1.18 (0.91 to 1.51)	1.30* (1.12 to 1.50)	1.01 (1.65 to 1.58)
Number of individuals	15,999	9,099	6,900	27,946	15,624	12,322
Number of countries	26	26	26	25	25	25
Age > 40	Total	Male	Female	Total	Male	Female
Person has a chronic illness	1.31** (1.23 to 1.40)	1.00 (0.87 to 1.15)	1.57** (1.44 to 1.70)	1.36** (1.21 to 1.53)	1.31 (0.98 to 1.76)	1.44** (1.29 to 1.60)
Number of individuals	22,630	12,316	10,314	42,658	22,944	19,713
Number of countries	26	26	26	25	25	25

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, educational attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate. All individuals are employed in the base year of either 2006 or 2008. Standard errors are clustered at the country-level. * $p < 0.05$, ** $p < 0.01$

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Text S3. Job loss risks in persons with a chronic illness among persons adjusting for gender equality, before the Great Recession 2006-2008 and during it 2008-2010

	Odds ratio of Job Loss					
	2006-2008			2008-2010		
	Total	Male	Female	Total	Male	Female
Person has a chronic illness	1.15**	0.79	1.53**	1.28**	1.29*	1.27**
	(1.07 to 1.24)	(0.58 to 1.08)	(1.37 to 1.70)	(1.07 to 1.52)	(1.02 to 1.64)	(1.15 to 1.40)
Number of individuals	37,426	20,825	16,601	68,393	37,505	30,887
Number of countries	25	25	25	24	24	24

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate. All individuals are employed in the base year of either 2006 or 2008. Models also control for country-specific differences, so called country 'fixed-effects'. Gender equality index: this measure of gender equality has been produced by the World Economic Forum and consists of measures with respect to four key indicators. We only use two of those here. Each measure indicator is measured on a scale of 0 to 1. First, this measures economic participation and opportunity, including the rates of participation, gendered pay gaps, and the number of women in key professional positions. Second, political empowerment is measured through the ratio of women to men in ministerial or parliamentary positions. This collection of measures is intended to be independent of the level of wealth in a particular country. Standard errors are clustered at the country-level. * $p < 0.05$, ** $p < 0.01$

Text S4. Job loss risks in persons with a chronic illness among persons adjusting for education as a categorical variable, before the Great Recession 2006-2008 and during it 2008-2010

	Odds Ratio of Job Loss					
	2006-2008			2008-2010		
	Total	Male	Female	Total	Male	Female
Person has a chronic illness	1.12**	0.79	1.48**	1.29**	1.31*	1.28**
	(1.06 to 1.18)	(0.57 to 1.08)	(1.34 to 1.64)	(1.09 to 1.53)	(1.04 to 1.64)	(1.16 to 1.42)
Number of individuals	39,574	21,415	17,214	70,604	38,568	32,035
Number of countries	26	26	26	25	25	25

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate. All individuals are employed in the base year of either 2006 or 2008. Standard errors are clustered at the country-level. * $p < 0.05$, ** $p < 0.01$

Text S5. Job loss risks in persons with a chronic illness among persons and weighting by population, before the Great Recession 2006-2008 and during it 2008-2010

	Odds Ratio of Job Loss					
	2006-2008			2008-2010		
	Total	Male	Female	Total	Male	Female
Person has a chronic illness	1.12**	0.86	1.35**	1.35**	1.45*	1.25**
	(1.06 to 1.18)	(0.64 to 1.14)	(1.11 to 1.63)	(1.14 to 1.61)	(1.14 to 1.85)	(1.14 to 1.39)
Number of individuals	39,574	21,918	17,656	73,133	40,008	33,124
Number of countries	26	26	26	25	25	25

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate. All individuals are employed in the base year of either 2006 or 2008. Standard errors are clustered at the country-level. * $p < 0.05$, ** $p < 0.01$

Text S6. Non-response on the unemployment variable

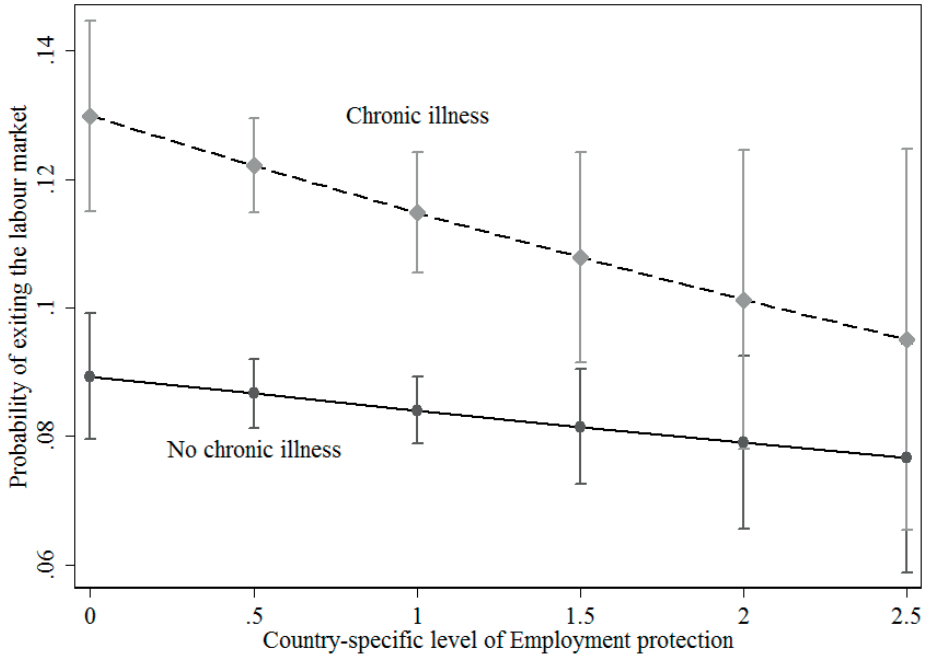|	Non-response on economic activity		Response on economic activity			
	N	Mean (Std. Dev.)	N	Mean (Std. Dev.)	Non-response - Response	p-value
Socio-demographic					(Std. Error)	
Age	3,937	38.64 (17.14)	99,898	49.01 (17.55)	-10.37 (0.28)	<0.001
Marital status	2,206	0.41 (0.01)	99,849	0.59 (0.002)	-0.18 (0.01)	<0.001
Education	484	2.99 (0.05)	98,342	2.93 (0.004)	0.054 (0.059)	0.36
Limiting health condition	584	1.17 (0.02)	87,960	1.32 (0.002)	-0.15 (0.03)	<0.001
Chronic illness	498	0.25 (0.019)	87,884	0.30 (0.002)	-0.054 (0.021)	0.009

Notes: Two-tailed t-test reported for difference between mean differences.

Text S7. Effect modification of employment protection policies on persons with and without chronic illness, adjusting for selection into employment in 2006

	Odds Ratio of Job Loss		
	2006-2008		
Chronic illness – without adjustment for selection bias	Total	Male	Female
Direct effect of employment protection for persons without a chronic illness	-0.11** (-0.03 to -0.19)	-0.16** (-0.05 to -0.26)	-0.05 (-0.13 to 0.03)
Modifying effect of employment protection for persons with a chronic illness	0.02 (-0.07 to 0.11)	0.18 (-0.02 to 0.38)	-0.10* (-0.01 to -0.20)
Number of individuals	34,263	19,078	15,185
Number of countries	21	21	21
Chronic illness – with adjustment for selection bias	Total	Male	Female
Direct effect of employment protection for persons without a severe health limitation	-0.11** (-0.03 to -0.19)	-0.16** (-0.05 to -0.26)	-0.05 (-0.12 to 0.03)
Modifying effect of employment protection for persons with a severe health limitation	0.01 (-0.07 to 0.10)	0.18 (-0.02 to 0.39)	-0.12** (-0.03 to -0.20)
Number of persons employed at baseline	75,983	35,725	40,258
Number of countries	22	22	22

Notes: Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. All models control for age, age-squared, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), percentage point change in unemployment rate, and whether respondent has a chronic illness. All individuals are employed in the base year of 2008. Employment protection is an average of the employment protection scores for dismissal and permanent work. Effect sizes are based on modelling the interaction between whether respondents have a chronic illness or not (Chronic illness =1) and the level of employment protection: $\beta 1 x$Chronic Illness + $\beta 2$Chronic Illness x Employment Protection + $\beta 3$*Employment protection. Standard errors are clustered at the country-level. Adjustment for selection uses a probit heckman selection model. * $p < 0.05$, ** $p < 0.01$

Figure S1. Probability of exiting the labour market (unemployment and economic inactivity) by health status and the level of employment protection, women, 2008.

Notes: All models control for age, age^2, marital status, education attainment, level of GDP per capita, change in GDP per capita (both measures of GDP are adjusted for inflation and purchasing power), unemployment rate (% of the labour force), change in unemployment rate (% of the labour force). Data on chronic (longstanding) illnesses or conditions refer to the self-declaration by the respondents of whether they have or have not a chronic (longstanding) illness or condition. Vertical bars represent 95% confidence intervals. Standard errors are clustered at the country-level. OECD employment protection index is taken from the Employment database, 2013 edition.

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