The long-term impact of involuntary unemployment and economic cycles on health in 13 European countries: Do unemployment benefits make a difference?

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Abstract

Unemployment is associated with poorer health, but at the aggregate level, higher unemployment rates are associated with better health. We simultaneously examine the long-run impact of involuntary unemployment and macroeconomic fluctuations over the life-course on illness, and explore the role of unemployment benefit (UB) policies. We link employment histories for adults in 13 countries from the Retrospective Survey of Health, Ageing and Retirement in Europe to unemployment and UB replacement rates during 1970-2008. We implement a country-fixed effect Cox Proportional Hazard model with time-dependent covariates. Results suggest contrasting patterns by gender: involuntary unemployment increases illness risk among men, while business cycles negatively influence men's health if experienced under low UB provisions. Although unemployment and business cycles do not influence women's health, higher UB provisions over the life-course reduce illness risk. Results stress the role of unemployment benefit policies in shaping the long-run impact of unemployment and business cycles on health.

Introduction

Two contradictory findings have shaped recent discussions on the link between unemployment and health: At the individual level, unemployment is associated with poorer health and increased mortality[1-9], but at the aggregate level, increased unemployment rates are often associated with short-term improvements in health and reduced mortality[10-16]. One potential explanation for this discrepancy stems from the fact that economic cycles and individual unemployment are associated but represent conceptually distinct exposures operating at different levels. On the one hand, economic cycles are a contextual exposure that influences factors unrelated to employment such as housing markets, inflation, consumer confidence and transport volumes, which can affect the health of both the employed and unemployed population via mechanisms other than job loss. Changes in these outcomes in response to economic downturns may have both health-damaging as well as health-preserving effects on these two groups[12, 17, 18]. In contrast, unemployment is associated with a substantial loss in earnings[19], and it may also influence health via several non-financial pathways such as chronic stress, reduced social interaction, decreased self-esteem and social recognition[8], and increased prevalence of smoking, drinking and physical inactivity[20]. Previous research has examined the contextual effects of business cycles alone[10-16], or the health effects of individual unemployment alone[1-9]. However, few studies have simultaneously examined how economic downturns and individual unemployment interact to influence health.

Most previous studies have focused on describing how health temporary improves or worsens during economic recessions and booms[10-16]. However, a substantial body of research suggests that, like unemployment[8, 21], recessions can have lasting consequences for a broad array of economic and social outcomes[22], which may be paralleled by long-lasting effects on health that are cumulative and manifest many years after exposure. Most previous studies relate year-to-year changes in aggregate unemployment rates to yearly changes in mortality[10, 11, 23, 24], an approach that does not capture the potential scarring or long-term effects of economic cycles on an individual's health. No studies, however, have linked individual experiences of unemployment with life-time exposure to business cycles over the life-course. Unemployment occurs more often in the context of worsening macroeconomic conditions, particularly when it is the result of mass layoff or business closure. Is the impact of economic downturns on health mediated by its effects on job loss due to the collapse of businesses? One possibility is that economic downturns have long-run scarring effects on the health of individuals who lose their jobs as a result of poorer economic conditions. An alternative hypothesis, however, states that economic downturns over the life-course have a broader impact on individual's health that are not mediate by the impact of recessions on job opportunities, for example, by increasing lifelong economic uncertainty, reducing housing wealth, altering behavior or diminishing consumption of potentially healthy goods.

Earlier research suggests that the impact of economic fluctuations[10-13, 25 14-16, 24, 26, 27] and unemployment[28, 29] may not be the same across countries with different welfare state policies. A potential policy of relevance is the level of unemployment benefit compensation, which varies greatly across countries and has changed substantially over the last decades within each country. For example, the first-year average replacement rate (the percentage of earnings received during the first year of unemployment) for Austria has ranged from 11% 1967 to 41% in 1998, while for Denmark it has ranged from 35% in 1966 to 81% in 1979. Does the generosity of unemployment benefit compensation buffer the impact of economic downturns and unemployment on health? The generosity and duration of unemployment benefit entitlements may influence health in at least two ways. Income from unemployment benefits may directly prevent a major drop in earnings enabling individuals to access resources relevant to health during unemployment spells. If this were the case, we would expect the health effects of economic downturns and unemployment to be weaker if experienced during times of generous unemployment benefit entitlements. Alternatively, unemployment benefits may also have a contextual effect by diminishing the stress associated with the fear of unemployment, potentially protecting the health of both the employed and unemployed population, particularly during economic downturns. If this were the case, we would expect unemployment benefits to have an overall protective health effect for the entire population regardless of their employment status, particularly during times of economic uncertainty.

In this study, we aim to shed light on some of these questions by exploiting data on economic fluctuations and full employment histories over the last 30 years in 13 European countries to examine whether business cycles have a cumulative effect on individual health, and explore how these effects interact with life-course histories of unemployment. We use nationally representative samples in 13 Europeans countries aged 50 to 74 who participated in the Survey of Health, Ageing and Retirement in Europe (SHARE). Exploiting trends in maximum unemployment benefit policies across these countries over the last 30 years, we are also able to examine whether the cumulative impact of business cycles and unemployment on health is buffered by higher unemployment benefit provisions. Differently from previous studies focused on short-term variations in health in response to the business cycles[10-16], our study links macro-economic data to individual life histories of employment from survey data to assess the long-run cumulative effects of economic cycles and unemployment on health. Previous studies suggest that the links between employment and health may differ for men and women. Therefore, we explore how economic cycles, involuntary unemployment and unemployment benefits differently influence the health of men and women. We address three major aims in this paper:

1. To examine whether individual histories of economic cycles and involuntary unemployment (due to plant/company closure) have independent long-term effects on health.

2. To assess whether effects of economic downturns on health depend on their impact on individual unemployment, by examining the interaction between economic cycles and individuals histories of involuntary unemployment.
3. To examine whether a policy of higher unemployment benefit provisions over the life-course mitigate the long-run impact of economic downturns and involuntary unemployment on health.

We hypothesized that (1) business cycles and individual unemployment histories over the life-course have each independent long-run effects on health; (2) the cumulative impact of economic recessions on health is negative and stronger for those who, as a result, have had long histories of unemployment spells over the life-course compared to those who have had more stable employment histories; (3) higher unemployment benefit provisions over the life-course lessen the long-run effect of economic downturns and unemployment on health.

To our knowledge, this is one of the first studies to simultaneously examine the long-run effects of individual unemployment, economic downturns and unemployment benefits on health. Our study differs from previous examinations and makes a contribution to understanding these questions in two ways. First, we use comprehensive retrospective histories of employment over the entire adult life collected using a harmonized instrument across countries, linked to aggregate unemployment rates for the period 1970-2008. Second, using data for several countries makes it possible to assess the contextual effects of business cycles and unemployment benefits in relation to individual experiences of unemployment in a way that is not possible in single-country studies. Our approach is innovative by bridging research on the health impact of macro-economic fluctuations with research on the health effects of individual unemployment, and examining the role of unemployment benefit policies in understanding these issues.

Methods

Data

Our study draws primarily on data from SHARE, a cross-national panel survey of representative samples designed to provide comparable information on the health, employment and social conditions of the non-institutionalized European population aged 50+. Samples in 13 European countries were drawn from national or regional population registries, or from multi-stage sampling in Northern Europe (Sweden and Denmark), Western Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands), Southern Europe (Spain, Italy and Greece) and Eastern/Central Europe (Poland and Czech Republic), as well as Ireland and Israel. Participants in each country were interviewed in 2004 and subsequently re-interviewed in 2006/7, 2008/9 and 2010/11. Interviews were face-to-face and took place in the household using structured computerized questionnaires. Expert agencies

translated items, with extensive pre-testing to ensure comparability. Response rates varied from country to country, but overall household response at enrolment was 62% [30-33]. Further details on the survey are available elsewhere [30-33].

Data on life histories of employment and health came from the 2008/09 wave of SHARE, which collected detailed retrospective life-histories expanding through early childhood until last interview. Our study included respondents who completed the life-history assessment and who had enrolled in the study in either 2004/5 or 2006/7. We used data from all countries except Ireland and Israel because they did not participate in the life history interview. In addition, life histories for Poland and Czech Republic were restricted to the period 1990-2009 due to incomparable data on the business cycle before that period. The total sample included 25,096 participants. We restricted the sample to participants aged 50 to 74 years as we considered retrospective reports beyond this age less reliable due to more frequent cognitive decline. The final sample comprised 16,552 men and women from 13 countries born between 1934 and 1959.

The Life History Calendar

Individuals may not accurately remember details of critical life events. The Life History Event Calendar was developed as a specific technique to help participants remembering past events more accurately[34, 35]. Participants were presented with a visual calendar that contained time on the top row, followed by several rows that corresponded to specific dimensions, e.g., employment, health and residential history. Participants were asked to identify specific events and indicate their timing using the calendar. This visual approach allowed respondents to cross-check the occurrence and timing of events across multiple dimensions of their life. For example, participants could visually inspect whether the timing of a job change corresponded with the timing of a change of residence. The Life History calendar offers a powerful approach that has been shown to substantially improve the accuracy of retrospective information[34, 35].

Health Assessment

Two set of health outcomes are defined: (a) retrospective life-histories of periods of ill health; (b) prospective, longitudinal health outcome assessed through in the panel for the period 2004-2010. We detail below the definitions of these two outcomes:

Retrospective life histories of ill health. Based on the life History Event Calendar approach we reconstructed life histories of adult periods of ill health. Participants were asked how many periods of ill health or disability lasting more than a year they had experienced during their adult life. This was chosen as a comprehensive health measure to identify potentially disabling health events that had a long-lasting effect on individuals and that may have been the result of cumulative processes operating

over several years. For each period of ill health reported, a loop of detailed questions was asked. Individuals were asked the medical conditions underlying each spell, the year of onset and the year each period of ill health ended. 168 participants reported having been ill or with disabilities for all or most of their lives and 205 participants reported having experienced more than three spells of ill health. These participants were excluded to avoid potential bias due to reverse causality, as these individual may have suffered from longstanding underlying disease potentially unrelated to their labor market histories.

We constructed a dataset with one record per year that indicated the onset of a new period of ill health for each participant. For example, an individual who experienced a heart attack in 1996 would have a record for each year of adult life up to 1995 indicating no illness, followed by a record for 1996 indicating the onset of illness. If no illness occurred after 1996, this individual would have a record for each year from 1997 to 2008 indicating no illness. We combined information for all spells in a single life-history database so that each participant had up to three spells with information on onset year and condition for each period of ill health.

Employment histories and unemployment spells

Data on employment histories came from the 2008/09 wave and covered the entire adult life starting from the age of leaving full-time education (or year of the first job for those without any schooling). Using the life-grid History Event Calendar, individuals were asked to report each paid job that lasted for 6 months or more. For each job, participants reported the year the job started; the occupation that best described the job based on the 10 broad categories of the International Standard Classification of Occupations (ISCO-88); the industry that best described the job based the 14 broad categories of the International Standard Industrial Classification of all Economic Activities (ISIC); whether job was part- or full-time, including changes during the time employed; and whether employment was as employee, civil servant or self-employed. For each job individuals had already left, they reported the year in which employment ended; the reason for leaving the job; whether there was a gap of 6 months or more before starting the next job; and the main activity carried out during the gap after leaving the job.

We constructed a database indicating for every given year whether an individual was working, as well as information on all variables associated with each job spell. An unemployment spell was defined as an episode of unemployment of six months or longer. Due to the potential for reverse causality from poor health to unemployment, it was necessary to identify episodes of unemployment that were potentially exogenous, as opposed to unemployment spells due to poor health. To overcome potential selection bias, we follow two approaches: recent studies have used job loss due to company downsizing or closure[4, 36-38]. This form of unemployment is generally considered less prone to selection than unemployment due to other reasons such as voluntary job termination or lay-off as it

can in principle affect workers of all levels. Therefore, based on the reported reason for leaving each job, we focus on involuntary unemployment due to plant or office closure. Unemployment due to other reasons ('resigned', 'laid off', 'mutual agreement', 'a temporary job had been completed', 'retired', and 'other reason') were placed in a separate category. Although unemployment due to plant/office closure may be random for workers within a given firm, there may still be selection of workers in to firms with different likelihood of closure. Therefore, we controlled for a wide set of childhood and mid-life health and socioeconomic conditions to control for selection effects.

Control Variables

We identified early and mid-life variables that clearly preceded unemployment experiences and that could operate as time-invariant confounders. Highest educational attainment was assessed based on national levels and then recorded into the three broad levels based on the International Standard Classification of Education (ISCED): Primary education or lower, secondary education, or post-secondary education. We incorporated extensive measures of childhood conditions, including: (a) self-rated health during childhood; (b) an index of childhood deprivation based on items available at the parental home (e.g. a fixed bath, water supply or central heating); (c) self-reported diagnosis of major childhood illnesses, reclassified into three binary indicators capturing whether the respondent suffered any major infectious, non-communicable or mental/cognitive condition as a child; (d) number of books in place where living at age 10 (None or very few, 11-25 books, 26-100 books, >100 books); (e) Occupation of the breadwinner, reclassified based on ISCO codes into six categories: non-manual (managerial, professional, technician, clerk or service), skilled agricultural worker, craft/trade worker, plant/elementary worker, armed forces, or missing.

Occupational group, industry, marital status and number of children were assessed at every year and treated as time-variant covariates. Occupational group was derived from the broad ISCO-88 self-reported categories, while industry was derived from the 14 categories of the ISIC code. Marital status was classified into married or in partnership, separated/divorced, widowed and unmarried. Number of children at every year was reclassified into no children, 1-2, or 3+ children.

Historical Unemployment Rates

We used country-specific unemployment rates as a percentage of the civilian labor force for the period 1956-2008 as measure of economic conditions. Data came from the Organization of Economic Cooperation and Development (OECD) annual labor force statistics (http://stats.oecd.org). To isolate the business cycle from secular trends in unemployment, we detrended the unemployment series using the Hodrick-Prescott-filter applying a smoothing parameter of 100 (HP) [39]. The HP-filter, typically used for the analysis of business cycles [40-42], separates the cyclical pattern of a time series from its general trend. It can be interpreted as the annual relative deviation in the unemployment rate from the

country-specific smoothed time trend. A negative deviation indicates a decline in the unemployment rate, while a positive deviation indicates an increase in the unemployment rate relative to the trend. In some analyses, we used the quintile of the deviation, with the lowest decline referring to the 20% lowest unemployment and the highest decile to the 20% highest unemployment relative to the country-specific smoothed unemployment trend. We matched country- and year-deviations from the unemployment trend to corresponding year-individual records from SHARE data.

Unemployment benefits

As summary measure of unemployment benefit entitlements we used gross replacement rates obtained from the Organization for Cooperation and Development (OECD) Benefits and Wages Statistics[43]. Gross replacement rates express benefits as a percentage of previous gross earnings (before tax) that would be received during an unemployment spell[43]. Benefits are the average for two earning levels, three family situations and three durations of unemployment, calibrated to the average production worker (APW) wages until 2005, and to the average worker for the period 2006-2009. It includes both unemployment insurance and unemployment assistance benefits[43].

OECD provides data with observations every two years for the period 1960-2009. We used values interpolated by the Center for Economic Performance (CEP) for odd years during 1960-2005[44], and applied linear interpolation to impute values for odd years during 2006-2009.

Approach

We aim to assess the health impact of life-time exposure to unemployment, economic cycles and unemployment benefits over the entire life course. We identified survival models as the most suitable approach whereby individuals are observed at some natural starting point until they develop an event or are censored. We model the onset of a spell of ill health as a function of time-variant employment status and deviations from the unemployment trend in a country and year fixed effect Cox Proportional hazard model, controlling for a wide set of time-variant and time-invariant covariates. An alternative logistic discrete-time model specification yielded nearly identical results. Employment status is updated yearly for each individual so that effects reflect total exposure over the adult life starting at age 30 until year of onset of illness or censoring for those who did not experienced a period of ill health. The basic model is as follows:

$$h_i(t) = \exp(\beta_1 U_{it} + \beta_2 T_{it} + \beta_3 I_i + \beta_4 UR_{jt} + \beta_4 UB_{jt} + \beta_5 C_j + \beta_6 T_t + \alpha_i) \quad (1)$$

Where $h_i(t)$ is the baseline hazard function for individual *i*, *U* is employment status and *T* a vector of time-variant covariates for individual *i* at year *t*, *I* is a vector of time-invariant covariates for individual *i*, UB is the replacement rate for country *j* in year *t*, and α is the error term. *C* is a fixed

effect for country that controls for all constant differences across countries, and *Y* is a vector of year dummies that controls for factors that vary uniformly over time in all countries.

To address the second and third aim of the study, a separate model examined interactions across individual- and country-level variables in the following specification:

$$h_i(t) = \exp(\beta_1 U_{it} + \beta_2 T_{it} + \beta_3 I_i + \beta_4 UR_{jt} + \beta_4 UB_{jt} + \beta_5 C_j + \beta_6 T_t + \beta_7 UB_{jt} * U_{it} + \beta_8 UR_{jt} * U_{it} + \beta_9 UB_{jt} * UR_{jt} + \alpha_i) \quad (2)$$

Where term $UR_{jt} * U_{it}$ represents the interaction between unemployment rates and individual unemployment, $UB_{jt} * U_{it}$ the interaction between unemployment benefits and individual unemployment, and $UB_{jt} * UR_{jt}$ represents the interaction between unemployment benefits and unemployment rates. The first two terms assesses whether the health effect of unemployment differs according to the state of the economy in a given country, while the second term assesses whether the effect of unemployment differs according to the unemployment benefits at the time of unemployment. The last term examines whether the impact of economic fluctuations differs according to the level of unemployment benefits.

Countries differ in some observed variables such as national income or other policies other than unemployment policies, but also on unmeasured variables such as culture, geographical proximity and behavior. Therefore, in all models, we include country fixed effects. This implies that the effect of aggregate unemployment rates and unemployment benefits on health is identified out of variations across cohorts within each country, thus controlling for all factors that differ between countries. For example, an individual born in 1950 and resident in Sweden will have a history of benefits that is different from that for another Swedish resident born in 1955. *UB* captures differences in the generosity of benefit entitlements over the life-course for these two individuals. Our models are therefore not confounded by differences across countries in variables that are fairly constant over time.

Results

Desciptives: illness, unemployment and business cycles at age 30 and beyond

Figure 1 shows that the likelihood of having had a period of ill health lasting a year or longer since age 30 ranges from 5% (Switzerland) to 23% (Czech Republic) among men, and from 8% (Austria) to 23% (Czech Republic) among women. Figure 2 shows that there are also large variations on the likelihood of experiencing a spell of unemployment due to plant or company closure, ranging from 0.5% (Austria) to 7% (Poland) in men, and from 2% (the Netherlands) to 9% (Poland) in women. Figure 3 shows the mean number of years spent in exceptionally high country-level unemployment since age 30, defined as the highest quintile of unemployment with respect to the country-specific trend. The mean years varied little across countries, but within countries, there were large variations across cohorts. For example, mean years spent in high unemployment ranged from 1 to 13 within Denmark, and from 3 to 11 in Belgium, reflecting the different timing of booms and recessions for different cohorts.

The link between business cycles and unemployment histories

A key question is whether unemployment due to plant or office closure reflects an unemployment shock that is to some extent related to aggregate economic conditions, as opposed to other forms of unemployment potentially resulting from poor health or individual characteristics. If this were the case, we would expect fluctuations in the business cycle to influence the likelihood of experiencing an unemployment spell due to plant/office closure, while there should be a weaker association for other forms of unemployment. Dark lines in Figure 1 show hazard ratios of job loss due to plant/office closure according to country-specific quintiles of deviations from the national unemployment trend for men and women separately, including fixed effects for country, year and early life variables. On average, longer exposure to higher levels of aggregate unemployment over the life-course was associated with a higher hazard of experiencing an unemployment spell due to plant/office closure in both men and women. For example, among men, years of exceptionally high country-level unemployment (highest quintile) were associated with a 38% (95%CI [Confidence Interval]= 1.14, 1.67) higher hazard of reporting an unemployment spell, as compared to years of exceptionally low unemployment (lowest quintile). This suggests that unemployment due to plant/office closure partly reflects the impact of exogenous fluctuations in the national economy on involuntary unemployment.

The impact of business cycles and unemployment histories on health

Figure 1 shows survival functions illustrating the hazard of developing a period of ill health by employment status between ages 30 and 74, controlling for age, year of birth, country and educational attainment. Employed men had clearly higher survival rates than men who had experienced a period

of unemployment over the life-course. Survival without illness was better for men who became unemployed due to plant/office closure as compared to survival rates for workers who were unemployed due to a variety of other reasons. However, both groups have lower survival than employed men. There was a similar pattern for women, but differences in survival were much less marked and relatively small for women who were employed vs. women who experienced unemployment due to plant/office closure. Lower survival rates were only clear for women who became unemployed due to other reasons, potentially including unemployment due to health-selection mechanisms.

Table 3 shows hazard ratios of a more robust model that controls for childhood conditions, time-invariant and time-variant covariates. The first row shows coefficients for the effect of business cycles (a deviation from the national unemployment trend), while the next rows shows the impact of different forms of unemployment and retirement, with the employed as reference category. First, there was little evidence of an overall effect of business cycle fluctuations in adult life on the risk of experiencing serious illness lasting a year or more. Hazard ratios were 1.00 (95%CI 0.89, 1.13) for men and 0.99 (95%CI 0.88, 1.11) for women. In contrast, unemployment due to plant/office closure was strongly associated with higher risk of experiencing a period of ill health in men (HR=2.10, 95%CI 1.21, 3.64) but not women (HR=1.06, 95%CI 0.95, 1.72). Unemployment due to other reasons (including being fired, voluntary termination of contract or termination due to mutual agreement) was associated with increased hazard of illness in both men and women, as was retirement. These two forms of labor market exit are however more prone to health-selection, as compared to estimates on the impact of unemployment due to plant/company closure.

The interaction between business cycles, unemployment and unemployment benefit policies

Results in Table 2 examine the interaction between business cycles, unemployment and maximum benefits provided during unemployment spells, controlling for a wider set of early and adult life covariates. For simplicity, only estimates for the variables of interest are presented, as estimates for other variables were very similar to those presented in Table 1.

Model 1 presents results first without any interaction. Among men, unemployment due to plant/company closure is associated with increased risk of illness, while business cycles (deviations from the national unemployment rate) and the level of unemployment benefits across the life-course have no effect on the risk of illness. In contrast, among women, unemployment and business cycles have no impact on health, but there is a strong effect of unemployment benefits. On average, an increase of 10 percentage points in the first-year average replacement rate (the percentage of earnings received during the first year of unemployment) was associated with a 16% significant reduction in the hazard of illness among women.

Model 2 summarizes the results of a more complex model that includes interaction terms between the three variables of interest. Among men, there was a significant negative interaction between the business cycle (deviations from the national unemployment rate) and the first-year unemployment benefit replacement rate. Results would suggest that the impact of national unemployment rates on health depends on the level of unemployment benefits in a given country and year, so that a 10-point increase in benefits would decrease the impact of a one-point increase in the unemployment rate relative to the trend by 18% ((HR=0.82, 95%CI 0.70, 0.96). To illustrate, under a policy scenario of no unemployment benefits, a one-point increase in the unemployment rate relative to the trend would lead to an increase of 36% (95%CI 1.19, 3.84) in the risk of illness. In contrast, the same one-point increase in the unemployment rate under a scenario of 50% first-year unemployment benefit replacement rate would lead to no significant increase in the risk of illness (HR=0.75, 95%CI 0.55, 1.02). There was no interaction between the national unemployment rate and individual experiences of unemployment, suggesting that the long-run effects of these exposures operate independently from each other.

The last column summarizes the results from Model 2 for women. Differently for men, there was no interaction between the national unemployment rate and the unemployment benefit replacement rate. Surprisingly, however, there was a significant positive interaction between individual unemployment due to plant/company closure and the unemployment benefit replacement rate. Two possible interpretations are possible. Estimates would suggest that, contrary to expectations, the impact of a spell of unemployment on illness is stronger in a scenario of higher unemployment benefit replacement rates. Alternatively, results would also indicate that the beneficial effects of higher unemployment benefits are smaller for women who become unemployed due to plant/company closure than for women who remained employment or leave the labor market for other reasons. These findings suggest that the beneficial effects of unemployment benefits observed for women may not be the result of direct cash benefits received during an unemployment spell, but may instead reflect other non-financial benefits that particularly influence women in the labor market.

Conclusion

Preliminary results offer a complex picture of the ways business cycles and individual unemployment influence health and suggest that effects differ substantially between men and women, and are partly dependent on the generosity of unemployment benefit policies. Among men, involuntary unemployment due to plant or office closure is associated with increased risk of long-term illness, regardless of the state of the economy or the level of unemployment benefits. On average, business cycles have no long-run effect on men's health, but there is a significant negative interaction with unemployment benefits so that economic downturns under a regime of low unemployment benefit replacement rates increases the risk of illness. In contrast to men, among women, individual unemployment and business cycles are not associated with health. However, a life-history of higher unemployment benefits is associated with reduced risk of illness. There is a significant positive interaction between individual unemployment and benefits, suggesting that higher unemployment benefits reduce the risk of illness among employed women, but not among women who become unemployed. Overall, our results indicate that the impact of unemployment and business cycles differs between men and women, and is strongly dependent on the generosity of unemployment benefit policies. Findings highlight the potential of unemployment benefits to reduce the negative health impact of economic downturns among men, and their potential to provide non-financial benefits that improve women's health overall.

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TABLES AND FIGURES

Table 1. Hazard ratio of the impact of unemployment on illness since age 30 in men and women aged 50-74 in 13 European countries (n=16,552)

	Men		Women	
	HR	95% CI	HR	95% CI
National unemployment rate (deviation)	1.00	(0.89 , 1.13)	0.99	(0.88 , 1.11)
Work status				
Employed	1.00		1.00	
Unemployed due to firm closure	2.10	(1.21 , 3.64)	1.06	(0.65 , 1.72)
Unemployed due to other reasons	4.58	(3.52 , 5.97)	1.37	(1.10 , 1.70)
Retired	1.95	(1.45 , 2.62)	1.55	(1.11 , 2.18)
Year of birth	0.86	(0.52 , 1.43)	0.62	(0.34 , 1.12)
Educational attainment				
Post-secondary education	1.00		1.00	
Secondary school	1.07	(0.80 , 1.42)	1.09	(0.83 , 1.43)
Primary school	1.28	(0.91 , 1.80)	1.15	(0.85 , 1.55)
Childhood health				
No serious illness during childhood	1.00		1.00	
1+ physical non-communicable disease	1.08	(0.89 , 1.33)	1.32	(1.09 , 1.61)
1+ Infectious disease	1.10	(0.88 , 1.37)	1.08	(0.83 , 1.40)
1+ Mental health condition	0.89	(0.46 , 1.74)	1.81	(1.11 , 2.93)
1+ other childhood illness	1.66	(1.21 , 2.29)	1.41	(1.08 , 1.85)
Index of childhood deprivation	0.99	(0.91 , 1.07)	0.93	(0.87 , 0.98)
Marital status				
Married	1.00		1.00	
Separated/divorced	0.72	(0.51 , 1.01)	1.29	(0.90 , 1.85)
widowed	0.35	(0.19 , 0.65)	1.05	(0.74 , 1.47)
unmarried	0.98	(0.33 , 2.94)	0.37	(0.14 , 0.99)
Number of children				
2 children	1.00		1.00	
No children	1.09	(0.79 , 1.49)	1.33	(1.01 , 1.75)
>2 children	1.14	(0.93 , 1.40)	1.06	(0.87 , 1.28)

Models incorporate age as X axis and also include country fixed effects, as well as controls for the number of books available at home at age 10, occupation of the breadwinner during childhood, and occupational class as well as industry classification for each job held during adulthood

Table 2. Hazard ratio of the impact of unemployment due to firm closure, national unemployment rate and unemployment benefits on the onset of illness since age 30 in men and women aged 50-74 in 13 European countries, 1970-2008*

	Men						Women					
	Model 1			Model 2			Model 1			Model 2		
	HR	low	high	HR	low	high	HR	low	high	HR	low	high
Unemployment due to firm closure	2.10	1.21 ,	3.64)	2.08	1.14 ,	3.79)	1.06	0.65 ,	1.73)	0.81	0.44 ,	1.50)
National unemployment rate (deviation)	1.01	0.89 ,	1.14)	1.13	0.95 ,	1.35)	0.98	0.87 ,	1.10)	1.03	0.88 ,	1.20)
Unemployment benefit (UB) replacement rate**	0.91	0.79 ,	1.05)	0.93	0.79 ,	1.09)	0.84	0.75 ,	0.95)	0.83	0.72 ,	0.95)
unemployment * national unemployment rate				0.81	0.45 ,	1.43)				0.83	0.44 ,	1.59)
Unemployment *UB replacement rate**				1.01	0.97 ,	1.06)				1.09	1.05 ,	1.12)
UB replacement rate*national unemployment rate				0.82	0.70 ,	0.96)				0.98	0.84 ,	1.15)

Models incorporate age as X axis and also include country fixed effects, as well as controls for unemployment due to other reasons, retirement, educational attainment, marital status, number of children, childhood health, childhood deprivation index, number of books at home at age 10, occupation of the breadwinner during childhood, and occupational class as well as industry classification for each job held during adulthood;

*Poland, Czech Republic and Greece are excluded from analysis due to lack of comparable data over time on unemployment benefit replacement rates

**Estimates are for a 10-percentage point increase in the first-year average replacement rate (the percentage of earnings received during the first year of unemployment)

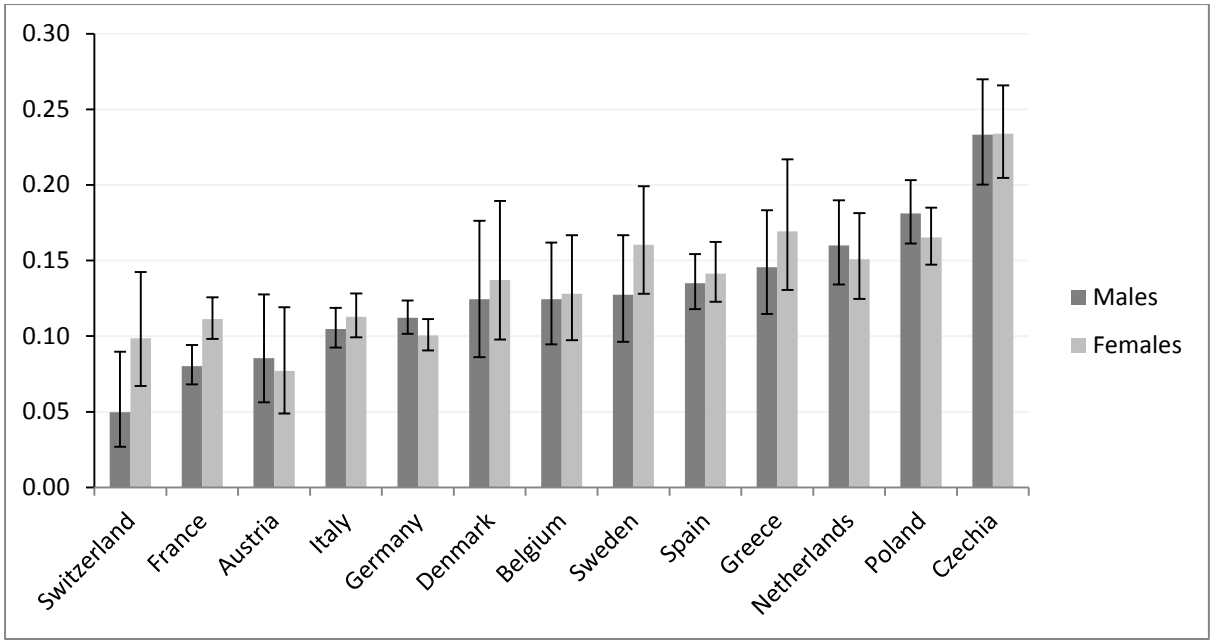

Figure 1. Proportion of respondents aged 50-74 who experienced at least one period of ill health lasting a year or longer since age 30 in 13 European countries

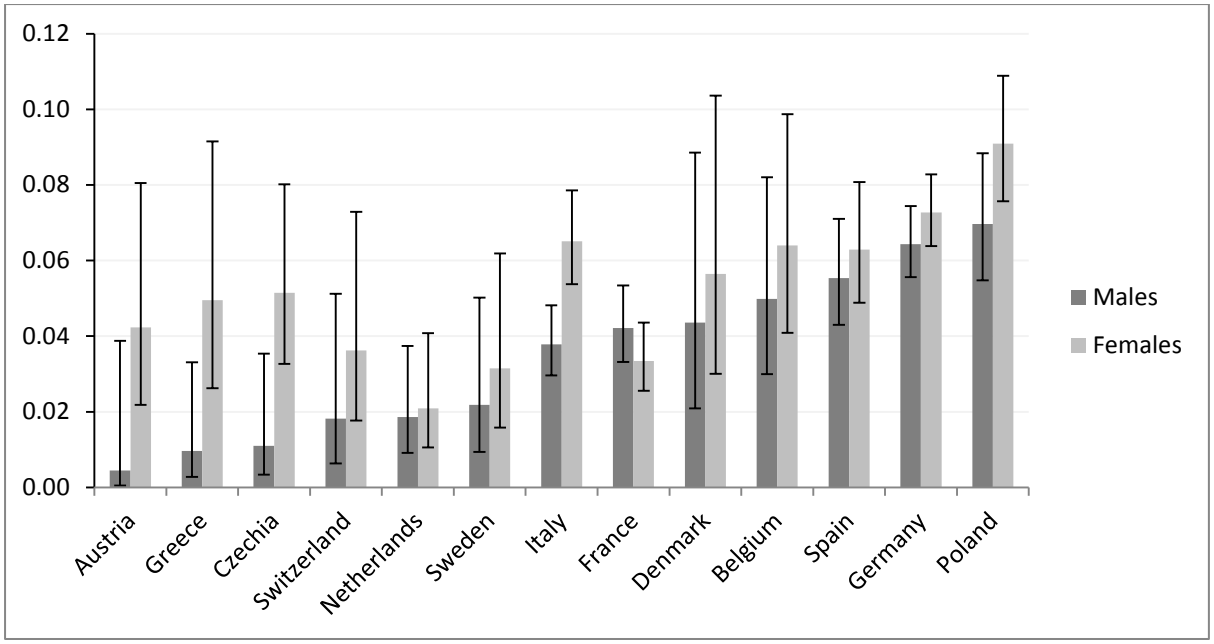

Figure 2. Proportion of respondents aged 50-74 who experienced at least one unemployment spell due to firm closure since age 30 in 13 European countries

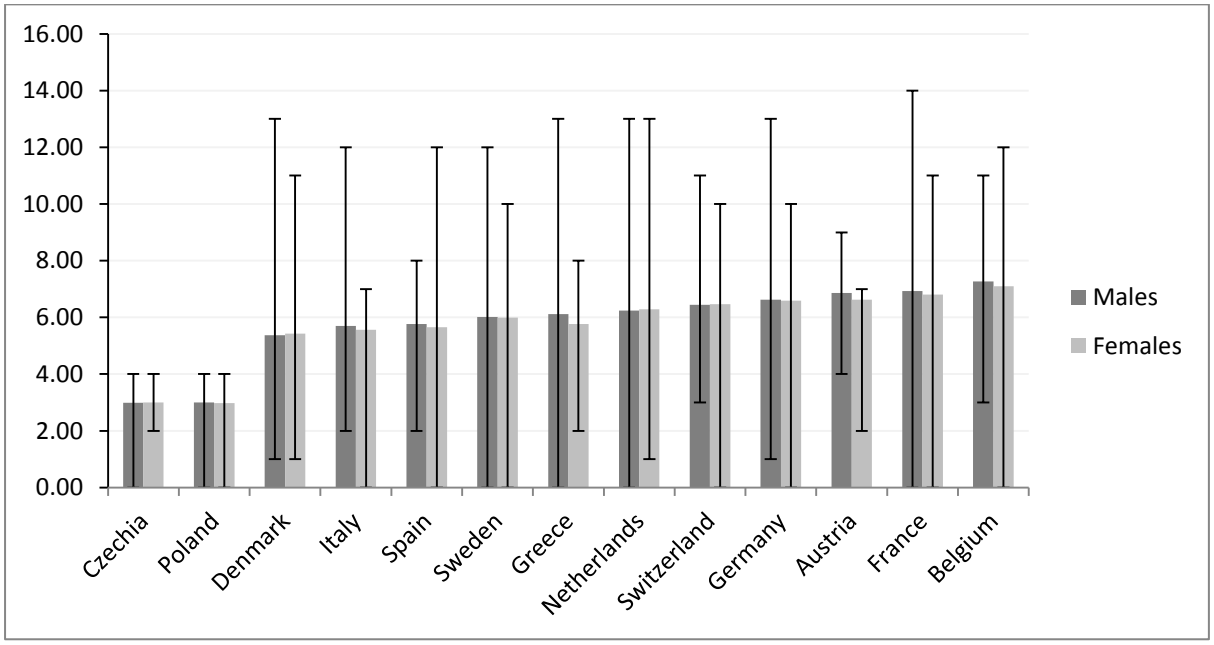

Figure 3. Mean, maximum and minimum years spent in 'recession' since age 30 among adults 50-74 in 13 European countries in the period 1970-2008*

*For Czech Republic and Poland, data correspond to the period 1990-2008 only

A recession is defined based on a positive deviation (increase) in the unemployment rate falling in the highest quintile of the country-specific unemployment trend

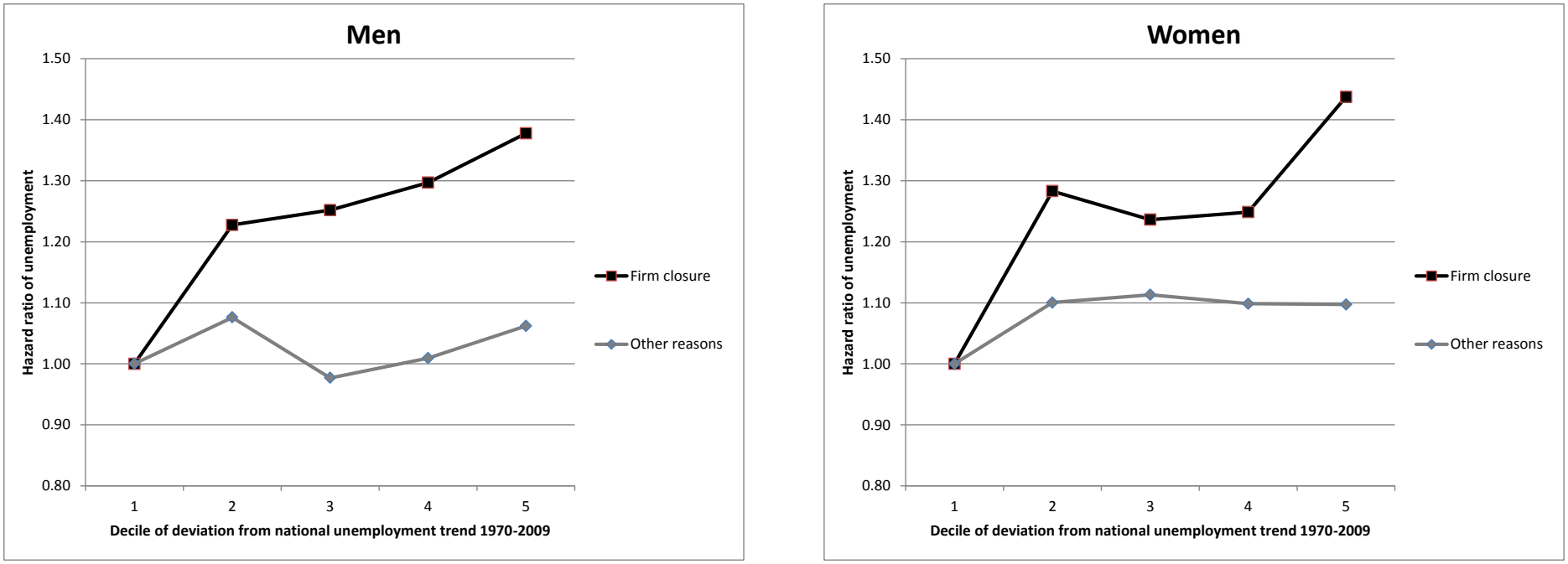

Figure 4. Hazard ratio of experiencing an unemployment spell according to country-specific decile of national unemployment rate in 1970-2009*

*For Czech Republic and Poland, data correspond to the period 1990-2008 only

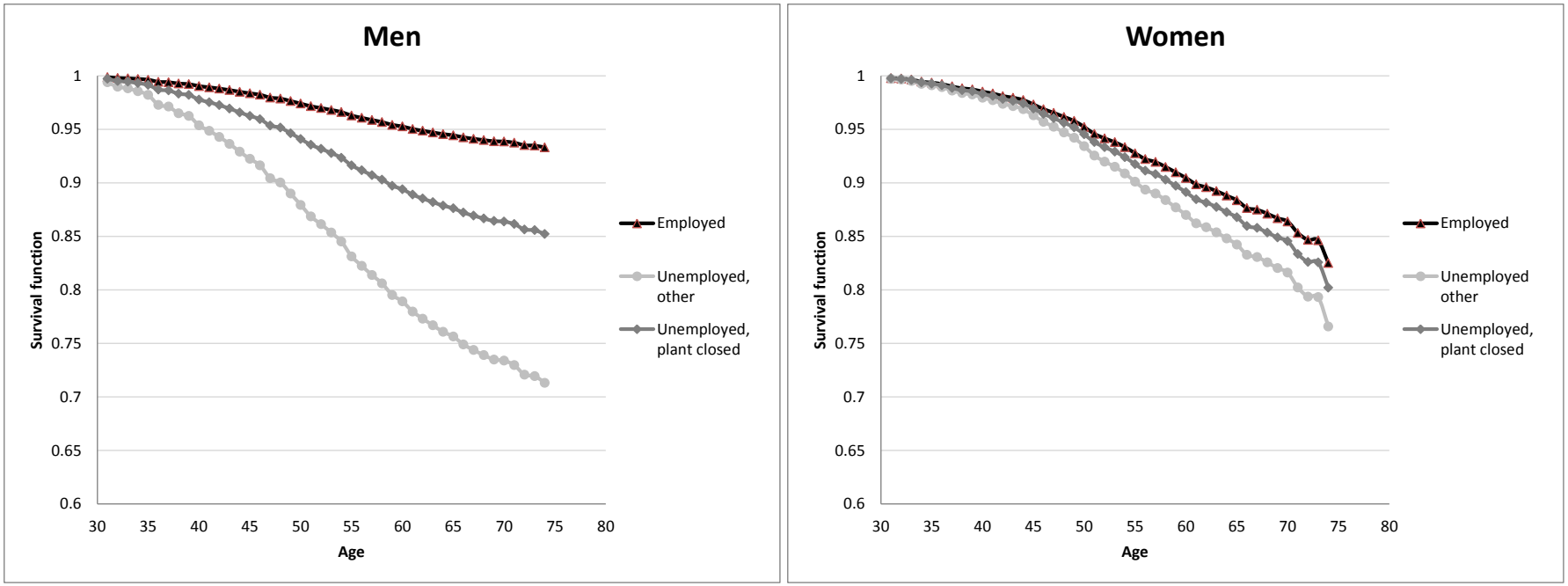

Figure 5. Survival from long-term illness according to employment status in men and women in 13 European countries