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Unemployment in Scandinavia during an economic crisis: Cross-national differences in health selection

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ABSTRACT

Are people with ill health more prone to unemployment during the ongoing economic crisis? Is this health selection more visible among people with low education, women, or the young? The current paper investigates these questions in the Scandinavian context using the longitudinal part of the EU-SILC data material. Generalized least squares analysis indicates that people with ill health are laid off to a higher degree than their healthy counterparts in Denmark, but not in Norway and Sweden. Additionally, young individuals (<30 years) with ill health have a higher probability of unemployment in both Norway and Sweden, but not in Denmark. Neither women with ill health, nor individuals with low educational qualifications and ill health, are more likely to lose their jobs in Scandinavia. Individual level (and calendar year) fixed effects analysis confirms the existence of health selection out of employment in Denmark, whereas there is no suggestion of health selection in Sweden and Norway, except among young individuals. This finding could be related to the differing labor market demand the three Scandinavian countries have experienced during and preceding the study period (2007–2010). Another possible explanation for the cross-national differences is connected to the Danish "flexicurity" model, where the employment protection is rather weak. People with ill health, and hence more unstable labor market attachment, could be more vulnerable in such an arrangement.

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1. Introduction

The first and most obvious effects of an economic crisis is observed through the raising of unemployment levels, and many workers' worst nightmare – to lose ones job – might therefore become reality. The unemployment experience is frequently coupled with financial hardships (Halvorsen, 1997), and the stress associated with being unemployed might even lead to health deterioration (Korpi, 2001; Montgomery et al., 1999). Since unemployment is correlated with a number of negative events, we need to ask ourselves an important question: to what extent are individuals with ill health overrepresented among the unemployed? The current paper will investigate health-based exit from employment, which is commonly referred to as *health selection*.

The presence of health selection on the labor market is already reasonably well established empirically (Virtanen et al., 2013; Butterworth et al., 2012; Arrow, 1996; Mastekaasa, 1996). Hence, focus should now be switched to *variances* in health selection over time and/or geographical space, in order to deepen our understanding of the phenomenon. The context of this study is set to the Scandinavian countries; Denmark, Norway and Sweden. These countries share many similarities, and are often classified within the social democratic "Welfare State Regime" (Esping-Andersen, 1990). However, there are some differences between these countries that are of crucial importance in labor market analysis. Firstly, the Scandinavian countries have experienced differing overall unemployment trends in the recent years. Secondly, the Danish "flexicurity" system implies that employees' employment protection is rather weak compared to the neighboring countries. These nuances could have vital consequences for the risk of unemployment for people with ill health.

The current paper asks two main research questions: (i) Do people who report ill health have a higher probability of experiencing unemployment during the economic crisis? (ii) Are there differences between the Scandinavian countries in the health selection-estimates? This study contributes to the existing literature on health selection in three ways: Firstly, by using the ongoing *economic crisis* as the research context. Health-based exit from employment could be operating differently during a recession,

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when the unemployment experience is more widespread. Secondly, through a cross-national *comparative focus*. Thirdly, by the attempt to establish a *causal link* between ill health and unemployment, with longitudinal data and estimated individual level (and calendar year) fixed effects. The EU-SILC data material is utilized, and the observational time period is the years 2007–2010.

2. Theory and previous research

2.1. Health selection

It is sensible to differentiate between a broad and a narrow definition of health selection. The *broad definition* is health-based mobility, which includes both entries to and departures from the labor force. The *narrow definition* is health-based exit from employment. The narrow definition thus refers to the selection process involved in unemployment- "recruitment", and asks whether individuals with bad health profiles are selected into unemployment to a higher degree than their healthy counterparts. But why should people with ill health be more prone to lay-offs? In order to explain health selection, we need to introduce one or several mechanism(s) that is theoretically capable of generating it (Hedström and Swedberg, 1996).

Three possible explanatory mechanisms springs to mind. Firstly, economic theory predicts that employers wish to keep the employees that are most productive, and the employees' health status might be used as a *proxy for productivity*. The productivity of a worker is difficult to measure precisely in many occupations, and the employer could therefore turn to more easily observable "signals": the number of sick days, for instance. Secondly, health-based lay-off decisions is probably related to Last-In-First-Out *seniority rules* (Lindbeck, 1994; von Below and Thoursie, 2010). People with ill health will often have more "gaps" in their work careers, due to elevated levels of sickness absence, and might therefore be laid off first. Moreover, people with ill health are most likely not an employers' first choice in a recruitment process, which leads to less seniority. Thirdly, people with ill health might struggle to enter the labor market due to employers' *discriminatory preferences* (Becker, 1971; Arrow, 1973), which would imply less seniority and higher lay-off risk for unfit individuals. Discrimination of people with ill health could for instance happen if the employer thinks that illness is correlated with undesirable personality characteristics, such as weakness of will. It is important to stress that the present data material is not suited for the testing of these different explanatory mechanisms, since the lay-off decision is not observed directly.

Health selection out of employment is problematic for at least three reasons. Firstly, many of those who seem to be too sick to work at a time of low demand will find work when demand rises (van der Wel et al., 2010; Bartley and Owen, 1996; Minton et al., 2012). Secondly, there are *cumulative disadvantages* linked to unstable labor market attachment, both regarding future employment (Eliason and Storrie, 2006), income levels (Gangl, 2006) and health status (Korpi, 2001). Thirdly, because of potential *human capital wastage*. If sick people who want to work are denied the opportunity, we are not maximizing the use of our societal resources. It is therefore necessary to establish whether – and to what extent – health selection is a driving factor in the layoff-process.

There are multiple studies which establish a link between ill health and subsequent risk of unemployment. Analysis of 11 European countries indicates that healthier people are more likely to become – or remain – employed than less healthy people (Schuring et al., 2007). Mastekaasa (1996) finds that people with psychological problems in Norway are more likely to lose their jobs. Similarly, analysis of Swedish data showed that suboptimal health status and health behavior predicted both unemployment occurrence, and prolonged unemployment (Virtanen et al., 2013). Moreover, results from Australia indicate that poorer baseline mental health was associated with greater time spent unemployed (Butterworth et al., 2012). Findings from Germany show that health selection affect different types of workers in different ways (Arrow, 1996). For foreign and female workers illness is positively associated with the risk of unemployment, but there is no such link apparent for German male workers. This latter study indicate the importance of stratified analyses, since it might be the case that health selection is more prevalent among specific subgroups. It might also be the case that health selection operates differently during a recession, when the unemployment experience is more widespread. Hence, the first research question of the current study is:

Do people who report ill health have a higher probability of unemployment during the economic crisis in Scandinavia?

2.2. Cross national differences: employment protection and labor market demand

Previous research on health-based exit out of employment has most often been performed on data materials from a single country, and cross-national comparisons are severely lacking (see Schuring et al., 2007 for an exception). A comparative focus could deepen our understanding of the phenomenon, and the present study will therefore investigate health selection in Denmark, Norway and Sweden. Are there dissimilarities between these countries that could have an impact on unemployment risk for people with ill health? The most distinct difference in labor market characteristics is probably related to the Danish "flexicurity" model. Basically, the flexicurity model consists of three parts: (i) minimal job protection, (ii) generous unemployment benefits, and (iii) active labor market policies (Van Kersbergen and Hemerijck, 2012). This implies that it is rather easy to fire employees in the Danish context. The employment protection regulation remains quite strong in Sweden and Norway, illustrated by the OECD strictness of employment protection index which is 2.135, 2.333 and 2.607 for Denmark, Norway and Sweden respectively throughout 2007–2010 (OECD, 2013). The rather weak employment protection in Denmark could imply that health selection is more pronounced here, since employers have "incentives" in favor of firing employees with ill health (see above).

Fig. 1 below shows the overall unemployment rates in the three countries from the year 2004 and ten years forward. Up until 2008, Norway and Denmark had almost identical unemployment trends,

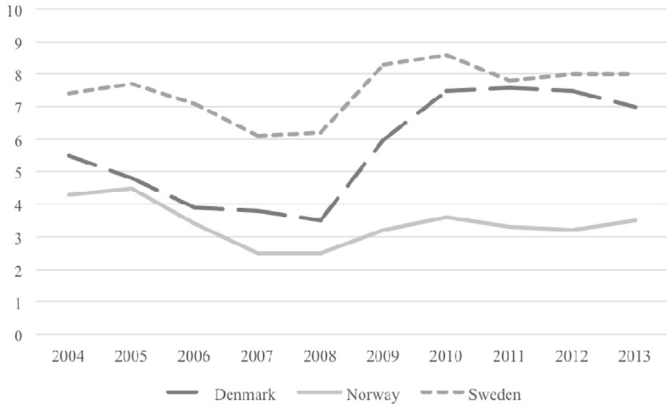

Fig. 1. Unemployment rates 2004–2013, by country.
Source: Eurostat.

with a slight reduction over time. The same trend is visible for Sweden, while the unemployment rate is considerably higher compared with the other two countries from 2004 to 2008. From 2008 – when the recession got its hold – there is a substantial growth in unemployment, especially for Denmark; from 3.5 per cent in 2008 to 7.5 per cent in 2010. Sweden witnessed a more minor rise, from approximately 6 to 8 per cent. The Norwegian labor market barely felt the economic crisis at all, and the unemployment rate remained low during the entire period.

One can thus differentiate between three unemployment trajectories: (i) Sweden has had a *continuingly high*, (ii) Norway a *continuingly low*, and (iii) Denmark a *rapidly increasing* unemployment rate. These variations in labor market demand can have an impact on the results of the following analysis, because the selection into unemployment operates differently in these divergent circumstances. For instance, in Norway – with high demand for labor – those who get fired might make up a highly selected group on a number of personal characteristics, including health status. If so, health selection could be quite elaborate. But the more favorable economic context in Norway means that quite few people have lost their jobs, and these lay-offs could possibly be unrelated to health status. The opposite argument applies for Sweden, where the unemployment population could be less selected on personal characteristics (including health), but the number of lay-offs is large enough to allow health to play a part. In addition, the continuingly high unemployment rate in Sweden could mean that people with ill health are underrepresented among the working population, and the amount of health-based exits from employment might be "constrained" by this fact.

Table 1
Cross-national comparison of employment protection and overall unemployment rate.

	Weak employment protection?	High unemployment rate?
Denmark	Yes	Yes
Sweden	No	Yes
Norway	No	No

The cross-national differences in employment protection schemes and overall unemployment rates are summarized in Table 1 above. Norway has a favorable economic climate and quite strict employment protection. The situation is different in Denmark, with weak employment protection and harsher economic context. Sweden occupies an intermediate position, with strong job protection and high unemployment. Denmark's weak employment protection scheme could lead to more health-based exits from employment, compared with the neighboring countries. But it is rather difficult to predict in which of the Scandinavian countries health selection will be most noticeable, due to differences in labor market demand during the preceding years. From the discussion above, we can formulate our second research question:

Are there differences between the Scandinavian countries in the health selection-estimates?

2.3. Covariates: education, age and gender

Jobs that require low levels of (educational) qualifications are often localized in labor market segments that are more "crisis-prone" (Bartley and Ferrie, 2001). Furthermore, the use of temporary labor contracts is more widespread in these segments, and it is hence easier to fire employees. In addition, an employee with higher educational level will often have the option of lowering his/her wage as a response to difficult economic times, whereas this might not even be an option for someone with lower educational level (due to minimum wage requirements). Hence, one would expect that individuals employed in "low-skill"- occupations are more likely to experience layoffs. Educational qualifications – a proxy for skill level – is therefore an important covariate in the following analysis.

Age is also an important variable in labor market analysis, both because young individuals are overrepresented among the unemployment population, and because of seniority rules (Lindbeck, 1994; von Below and Thoursie, 2010). Young people frequently experience unemployment spells, partly caused by difficulties in entering the labor market. And when they do enter the labor force, young peoples' risk of lay-offs is elevated due to lack of seniority. This is reflected by the differences in unemployment rates for younger and older workers in Scandinavia in the years 2007–2010 (see Figure A1 in appendix). Older workers, on the other hand, have a more stable labor market attachment. In addition, (old) age and ill health are correlated, and statistical models not including age could therefore be biased.

The Scandinavian labor markets are highly gender-segregated horizontally, and this implies that men and women – on average – work in different segments of the workforce (Blackburn et al., 2000; Charles, 1992; Birkelund, 1992). If the negative consequences of the ongoing recession is concentrated in male- or female-dominated parts of the labor market, the statistical models will be miss-specified without gender. In addition, women have a higher prevalence of part-time work in the Scandinavian context (Rosenfeld and Birkelund, 1995), and if the transition from part-time work to unemployment is more common than the same transition from full-time work, the models will be biased.

3. The Scandinavian research context

The presence of health selection is already reasonably well established empirically, and focus should now be switched to *variances* in health selection over time and/or geographical space, in order to deepen our understanding of the phenomenon. Potential differences between the Scandinavian countries could possibly help us in reaching this objective.

There are two reasons for choosing Denmark, Norway and Sweden as the research context. Firstly, the Scandinavian countries are similar in many regards, and the comparison of estimates is thus possible from a substantive point of view. The Scandinavian countries share a whole range of characteristics, e.g. high tax levels and high public spending on welfare. In contrast, it is not straightforward to compare countries that are highly dissimilar in labor market structure and welfare state arrangements. The second reason is more directly related to health selection research, namely that the overall unemployment rate during the ongoing recession is not overwhelmingly high in Scandinavia. In countries with extremely high unemployment, health selection out of employment is probably relatively small (Schuring et al., 2007), because there is no systematic selection on health when "everyone" is made redundant.

The Scandinavian countries are strikingly similar in overall labor force participation among 25–59 year olds throughout the investigated time window: between 82 and 85% (Eurostat, 2014). Sweden have lower labor force participation among the young (<25 years), and Denmark have lower employment rates for those over 60 years. Average retirement age in 2010 is 62.3, 63.5 and 64.4 in Denmark, Norway and Sweden respectively (Halvorsen and Tägtström, 2013). Age is included as a covariate in order to ensure that these minor differences will not bias the following analysis. Because of a continued focus on securing high employment in Scandinavia (the so-called "work line"), there are few alternatives, apart from retirement, to the unemployment category. The only noticeable exception is those receiving disability benefits, which

Table 2
Longitudinal participation rates, by country (number and per cent).

Number of survey participations	Denmark		Norway		Sweden	
	N	%	N	%	N	%
1	558	2.98	3274	11.30	2558	8.80
2	5312	28.39	6138	21.18	8032	27.63
3	6372	34.06	5196	17.93	9021	31.03
4	6468	34.57	14,368	49.59	9464	32.55
Total	18,710		28,976		29,075	

consist of people who have been sick/injured for a quite extensive amount of time. This will probably not bias the results since focus in the fixed effect models is on *change* in health (i.e. people who become sick).

Still, there are some other potential problems that could make the interpretation of results challenging. One relevant example is *differing labor market structure*; the use of temporary employment might be considerably higher in one of the countries, for instance. If this is the case, and temporary employment contract is correlated with health status, our statistical models could be miss-specified. *Sector-specific crisis* is another example. If only the car industry in Sweden were hit by the recession, and we have no way to capture this in our models, the statistical associations will most likely be biased. We therefore need to be cautious in the interpretation of results.

4. Data and method

4.1. Data

The longitudinal part of the European Union Statistics on Income and Living Conditions (EU-SILC) data material will be employed in the following analysis. The EU-SILC is an annual survey which provides micro data on a variety of variables, including labor market attachment and health status. The EU-SILC has a panel structure, and surveys from the years 2007, 2008, 2009 and 2010 is applied so that we can follow the same individuals from before the outbreak of the economic crisis until the "peak" of the recession (see Fig. 1 above). The data material is well suited for the current paper, as it allows cross-national comparison of health selection. Table 2 below presents the participation rates. The Norwegian sample is the most balanced one, where almost half of the respondents have answered the survey questions four times.

4.2. Operationalization

Dependent variable in the following analysis is *unemployment*. The dummy variable is constructed from two questions: "Actively looking for a job in the previous four weeks?" and "Available for work in the next two weeks?" If the respondent answers yes on both, he/she is coded 1, otherwise 0. A potential problem with this variable is that it does not take into account those who would like to work, but take no actions to find work because they believe they would not succeed (Bartley and Ferrie, 2001). This is probably less of a problem in Scandinavia, where unemployment benefits are accompanied with active labor market policies that require the unemployed individual to look for work in order to receive benefits. Another worry is how participants of re-employment programs will reply to the abovementioned questions. This will most likely not be a major issue, since the participants have to search for work continuously and are allowed to leave the program if a job opportunity arrives.

The current *ill health* measure is limiting long-standing illness (LLSI). This dummy variable is constructed from answers to two related questions: "Suffer from any chronic (long-standing) illness or condition?", and "Limitations in activities people usually do because of health problems for at least the last six months?" If the respondent answers "yes" to the first question and either "yes, strongly limited" or "yes, limited" on the second, he/she is coded 1. It would obviously be preferable to have a more objective measure (medical diagnoses, for instance), but it seems as though the reliability of self-reported health measures are satisfactory (Martikainen et al., 1999). But why is LLSI appropriate for the study of health-based exit out of employment? LLSI captures quite serious illnesses, which probably are more noticeable for employers, at least compared with less severe conditions. The results might, however, be sensitive to the measure used, and therefore a less serious ill health measure (long-standing illness) will be included as a robustness check.

Educational level consists of two dummy variables computed from the question on highest ISCED level attained. Pre-primary, primary and lower secondary is collapsed to *primary education*. (Upper) secondary and post-secondary non-tertiary is collapsed to *secondary education*. People who have attained higher educational qualifications (*tertiary education*) are the reference category. Age is derived from the questions on year of birth and year of survey, and is thereafter recoded into two dummy variables: *Old age* (= >60 years) and *young age* (= <30 years). Respondents from the age of 30–59 is therefore the reference category. In addition, the continuous variables *age* and *age squared* is used as covariates in the fixed effects analysis. People who get married could possibly be different on unobserved individual characteristics, and models without a marriage variable could hence be miss-specified. Those who report to be *married* is coded 1 (else = 0), and the variable is included in the fixed effects analysis.

Table 3
Descriptive statistics, by country and gender (per cent).

	Denmark		Norway		Sweden	
	Men	Women	Men	Women	Men	Women
Variables						
Unemployment	2.8	2.6	1.6	1.6	3.6	3.5
Ill health (LLSI)	6.3	9.1	6.1	8.8	6.4	10.2
Educational level						
Primary education	27.0	28.5	24.9	24.9	23.4	20.5
Secondary education	44.3	37.5	43.2	39.1	52.7	47.2
Tertiary education (Ref.)	27.1	32.5	28.8	32.4	22.5	31.1
Age (Min. 17–Max. 81)						
Mean (Std. Dev.)	49.18 (17.22)	48.91 (16.41)	45.71 (17.44)	45.67 (17.24)	46.90 (18.53)	47.49 (18.19)
Young age	16.0	14.2	21.2	20.5	22.4	20.3
30–59 (Ref.)	52.6	56.9	54.8	56.2	48.3	50.4
Old age	31.4	28.9	24.0	23.3	29.2	29.3
Married	67.7	65.2	55.3	55.5	51.0	50.9
N	9496	9853	15,722	15,643	15,351	15,407

4.3. Descriptive statistics

Descriptive statistics are presented in Table 3 below. The unemployment experience is more or less identically distributed among men and women in all three countries. Respondents in Sweden have experienced the most unemployment on average, followed by Denmark and Norway (see appendix for chi square- and t-tests). Women report more limiting longstanding illness than men in all three countries, while the differences between countries are negligible.

The educational level is fairly equally distributed among the three countries, and there are no major differences between the Norwegian and Danish respondents. Sweden is somewhat dissimilar, with relatively few respondents with primary education, and fewer male respondents with tertiary education. There are a bit more women than men with higher educational qualifications in all three countries, and the "gender gap" in education is largest in Sweden, where 31.1% women and only 22.5% men have tertiary education. The gap is considerably smaller in Denmark and Norway: approximately 5 per cent.

The respondents from Denmark are married to a higher extent, and the mean age is lowest in Norway, followed by Sweden and Denmark. The main reason for the mean age being lowest in Norway is the relatively low number of respondents of age 60 and above. In contrast, the Danish sample is comparatively old because of rather few respondents below the age of 30. The gender differences in age and marital status are small.

4.4. Analysis

The first part of the following analysis consists of linear probability models of unemployment, controlling for ill health and different covariates (education, age and gender) and interactions between health and these covariates. The aim is to establish whether there are certain groups that are more prone to health selection during the economic crisis. Unemployment is a dichotomous dependent variable and it could therefore be tempting to use logistic regression, but Mood (2010) warns about a number of pitfalls. A solution to these challenges is to rather use linear probability models. Ordinary least squares (OLS) assumes that all observations are uncorrelated, and will therefore yield biased standard errors when estimated on longitudinal individual data. Generalized least squares (GLS) corrects for the fact that the observations cannot be treated as independent random draws, and are therefore preferable. OLS models with standard errors clustered on individuals have also been estimated (not presented), and the results are basically the same as those derived from GLS.

The GLS analysis rests on the *random effects* assumption, which implies that unobserved differences across individuals are uncorrelated with the independent variables and the error term (Allison, 1994). This is a rather strict assumption that is unlikely to be fulfilled in non-experimental settings. But if we specify a *fixed effects* (FE) model on panel data we automatically control for all unobserved differences that don't change over time. Individual level FE models will therefore be estimated, so that time-invariant personal characteristics can be controlled for (Halaby, 2004; Gangl, 2010). The FE analysis is performed on a subsample that excludes people who were unemployed and/or had ill health in 2007, before the onset of the economic crisis. The basic idea is to investigate if there is a causal relationship between a *change* in health and a *change* in unemployment status. Previous research on health selection out of employment has seldom been able to establish a causal relationship, and the present study will try to remedy this limitation. The following equation will be estimated:

$$Y_{it} = \beta_1 X_{it1} + \beta_2 X_{it2} + v_i + \varepsilon_{it}$$

Where Y is unemployment, $_i$ represents the individual, and $_t$ represents time. β_1 is the parameter of interest, namely the effect of a change in health. v represents all unobserved factors that vary across individuals but are constant over time, while ε represents all unobserved time-varying characteristics. Calendar year dummy variables (β_2) will capture potential underlying time-trends in the unemployment experience, while additional time-variant covariates (marital status, educational level, age) will be included in some model specifications. In addition, a number of sensitivity tests will be performed. Unobserved heterogeneity is still an issue of some concern, however, since we have no way of controlling for other things that has changed during the observational period that might cause people with ill health to lose their jobs. Moreover, it would be preferable to include a time lagged health measure in order to be more certain that the causal direction is not the opposite, i.e. that unemployment causes ill health. This was unfortunately not possible, due to a rather low number of observations.

5. Results

Table 4 below contains results from GLS estimation of unemployment, by ill health, education level dummy variables and interactions between education and ill health (model 1). The education dummies are replaced by age dummies in model 2. We start with model 1 (column 1, 3 and 5), and the ill health measure is positive and statistically significant in Denmark. People with ill health are more likely to experience unemployment, even while holding educational level constant (reference category: tertiary education). In Norway, however, the ill health coefficient is small and far from significant. The relationship is significant in Sweden, but the ill health coefficient is actually *negative*. This means that highly educated people with LLSI have a lower probability of unemployment.

Unsurprisingly, people with low educational qualifications are more prone to unemployment in all three countries. The same is true for people with a more intermediate level of education, although only for Denmark and Sweden. Thus, the unemployment experience seems to have been concentrated among low-skill workers in Norway, reflecting the higher overall demand for labor here, compared with the neighboring countries. But what is more surprising is the apparent lack of an interaction effect between ill health and educational level: neither of the interactions are statistically significant.

Moving on to the age-stratified analysis (model 2, columns 2, 4 and 6), we witness the same cross-national differences in health selection, and the coefficient is actually a bit larger for Denmark in this model (reference category: 30–59 years). The age dummies indicate the expected direction for all three countries, with younger individuals being more prone to unemployment and older workers being less so.

Young individuals with LLSI have a higher probability of experiencing unemployment in both Norway and Sweden, whereas this is not the case in Denmark. People over 60 years with ill health are significantly less likely to lose their jobs in Denmark, but this protective "seniority effect" is neither present in Norway nor Sweden. In summary, although Denmark is the only country where health selection exists as a general phenomenon, the interaction effects reveal that both young and old workers with health challenges fare pretty well. The opposite is true for Norway and Sweden, where health selection only happens among the younger parts of the workforce.

There are no gender differences in neither unemployment prevalence nor health-based exit from employment (see Table A3 in Appendix). These results hold for all three countries.

Table 4
Result from GLS analysis of unemployment, by ill health, education and ill health × education (model 1) or ill health, age and ill health × age (model 2).

	Denmark		Norway		Sweden	
	(1)	(2)	(1)	(2)	(1)	(2)
Constant	0.016*** (0.003)	0.025*** (0.002)	0.012*** (0.002)	0.011*** (0.001)	0.024*** (0.003)	0.028*** (0.002)
Ill health	0.024** (0.009)	0.036*** (0.007)	0.005 (0.007)	0.004 (0.004)	−0.019** (0.008)	−0.003 (0.006)
Primary education	0.027*** (0.004)		0.020*** (0.002)		0.017*** (0.004)	
Secondary education	0.011** (0.004)		−0.000 (0.002)		0.022*** (0.003)	
Primary education × ill health	−0.014 (0.012)		−0.013 (0.009)		−0.000 (0.011)	
Secondary education × ill health	−0.010 (0.012)		−0.001 (0.008)		0.011 (0.010)	
Young age		0.041*** (0.004)		0.033*** (0.002)		0.066*** (0.003)
Old age		−0.016*** (0.004)		−0.008*** (0.002)		−0.021*** (0.003)
Young age × ill health		0.023 (0.020)		0.051*** (0.010)		0.034** (0.016)
Old age × ill health		−0.037*** (0.010)		−0.006 (0.006)		−0.000 (0.009)
R^2	0.004	0.019	0.005	0.017	0.003	0.031
Individuals	7118		12,431		12,470	
Observations	19,349		31,375		30,753	
Significance level	*** = 0.01** = 0.05* = 0.1 NS/(empty) = >0.1					

Reported standard errors (in parentheses) are clustered on individuals.

Table 5
Result from GLS regression of unemployment, by ill health, calendar years, and ill health X calendar years.

	Denmark	Norway	Sweden
Constant (Ref.: 2007)	0.018*** (0,0035)	0.017*** (0.002)	0.031*** (0.003)
Ill health	−0.008 (0.013)	0.005 (0.005)	−0.011 (0.009)
2008	0.006* (0.004)	0.000 (0.002)	0.003 (0.003)
2009	0.009** (0.004)	0.002 (0.002)	0.010** (0.003)
2010	0.014*** (0.004)	−0.000 (0.002)	0.009** (0.003)
Ill health × 2008	0.030** (0.015)	−0.008 (0.007)	0.005 (0.011)
Ill health × 2009	0.027* (0.014)	−0.009 (0.006)	−0.003 (0.011)
Ill health × 2010	0.025* (0.014)	0.002 (0.007)	−0.008 (0.011)
R^2	0.002	0.000	0.001
Individuals	7118	12,431	12,470
Observations	19,349	31,375	30,758
Significance level	*** = 0.01** = 0.05* = 0.1 NS/(empty) = >0.1		

Reported standard errors (in parentheses) are clustered on individuals.

The Scandinavian countries have experienced differing labor market conditions during the economic crisis, and it is therefore possible that health selection is only present in Denmark due to variances in the state of the economy. To investigate this possibility further, a GLS model with dummy variables for calendar year and interactions with ill health have been estimated (see Table 5 below). None of the included variables are significant for Norway, reflecting the mild impact of the crisis. The risk of unemployment is, however, significantly elevated for Denmark and Sweden in 2009 and 2010. The coefficients are quite similar for the year 2009 (0.009 and 0.010), and respondents with good health were thus about as likely to experience unemployment in the two countries in 2009. But the estimates for individuals with ill health tells a completely different story: There is a significantly elevated risk in Denmark, compared with a non-significant coefficient for Sweden.

The preceding analyses have indicated that health selection is present in Denmark, but not in the remaining two countries. But GLS estimation does not deal properly with unobserved individual

Table 6
Results from fixed effects (FE) analysis of unemployment (2008–2010), by ill health and covariates.

	Denmark		Norway		Sweden	
	(1)	(2)	(1)	(2)	(1)	(2)
Ill health	0.015* (0.008)	0.016* (0.008)	0.004 (0.008)	0.004 (0.007)	0.001 (0.007)	0.002 (0.007)
Covariates (in addition to individual level and calendar year fixed effects)	None	Age, education, marital status	None	Age, education, marital status	None	Age, education, marital status
R^2	0.004	0.008	0.004	0.004	0.005	0.016
Individuals	6955	6955	11,667	11,664	11,947	11,875
Observations	18,710	18,710	28,976	28,966	29,075	28,999
Person/years	291/803	291/803	255/781	255/780	614/1726	614/1726
Significance level	*** = 0.01** = 0.05* = 0.1 NS/(empty) = >0.1					

Reported standard errors (in parentheses) are clustered on individuals.
Individuals/observations refers to the total sample, while *person/years* is the number of observations contributing to the FE estimates.

Table 7
Results from fixed effects (FE) analysis of unemployment by ill health and covariates – sensitivity tests.

	Denmark		Norway		Sweden	
	(1) Balanced panel	(2) Subgroup: prime age	(1) Balanced panel	(2) Subgroup: prime age	(1) Balanced panel	(2) Subgroup: prime age
Ill health	0.018* (0.009)	0.034** (0.015)	0.000 (0.008)	−0.003 (0.011)	0.004 (0.008)	−0.011 (0.014)
Individuals/observations	3741/12,840	3836/10,277	5324/19,559	6534/16,193	5373/18,485	5947/14,453
Person/years	160/541	142/388	172/614	90/282	362/1222	217/634
	(3) Unemployed II	(4) Health measure II	(3) Unemployed II	(4) Health measure II	(3) Unemployed II	(4) Health measure II
Ill health	0.023** (0.008)	0.014** (0.006)	0.011* (0.006)	−0.001 (0.004)	0.005 (0.006)	0.009* (0.005)
Individuals/observations	6955/18,710	6955/18,710	11,664/28,966	11,664/28,966	11,875/28,999	11,875/28,999
Person/years	255/718	291/803	186/574	255/780	507/1458	614/1726
Significance level	*** = 0.01** = 0.05* = 0.1 NS/(empty) = >0.1					
Covariates:	Calendar year dummies, marital status dummy, educational level dummies, age and age squared.					

Reported standard errors (in parentheses) are clustered on individuals.
Individuals/observations refers to the total sample, while *person/years* is the number of observations contributing to the FE estimates.

characteristics that might bias the results. Table 6 below present results from individual level (and calendar year) fixed effects. Model 1 does not include any additional covariates, while model 2 includes age, age squared, educational level and marital status. The Hausman test, which compares random- and fixed effect models to see whether the coefficients are equal, has been performed, and the null hypothesis is rejected for all three countries in model 1 (Chi square: −8.36, −12.12, and −16.77 for Denmark, Norway and Sweden respectively). The FE model should therefore be preferred. The analysis confirms the existence of health-based exit from employment in Denmark, while the same relationship is not apparent in Norway and Sweden. The inclusion of covariates in the FE analysis does not alter this result. Basically the same results are derived from an equation in which only unemployment in 2009 and 2010 are considered (not shown). The only exception being that the coefficient for Denmark is somewhat higher (0.018) and significant at the 95% level.

The age-stratified analysis in Table 4 indicated that young people are more prone to health selection in Norway and Sweden, and results from FE analysis among younger workers (see Table A4 in Appendix) confirms the presence of health-based exit from employment in both countries. Young individuals with ill health thus seems to be in a precarious position in the Norwegian and Swedish labor market. The coefficient is not statistically significant for Denmark, but it should be noted, however, that the Danish sample is comparatively old (see Table 3). This implies that the statistical power is quite low, especially since there are rather few individuals who report to have experienced both ill health and unemployment among the younger workers.

Table 7 below presents results from robustness testing. The evidence presented earlier could possibly be biased because the panel is unbalanced, i.e. the data material does not contain observations from all individuals for all years. Model 1 consists of a panel in which the individuals have participated in the survey at least three years, and the results remain robust. Model 2 presents estimates from a subgroup analysis, where younger and older workers have been excluded. Health selection is still present in Denmark, and the ill health measure is considerably larger in this specification.

Model 3 presents estimates derived from an equation where the outcome variable has been changed. Here the unemployment measure is based on a question regarding respondents' self-defined current economic status, and those who report being unemployed are coded 1. Again, the results remain basically unaltered, except for the fact that the ill health measure is now significant for Norway as well. In model 4, a different health measure has been included, namely longstanding illness. The results still hold for Denmark, and in this model specification the coefficient is significant for Sweden. The sensitivity testing thus tells a consistent story regarding health-based exit from employment in Denmark, while there is only scant evidence of health selection in Norway and Sweden. The next section will discuss the empirical findings in more detail.

6. Discussion

This study has investigated whether ill health predicts unemployment in Scandinavia, and if the association differs between the three countries. The findings from the analysis can be summarized in two main points: Firstly, there is a causal link between ill health and unemployment in Denmark, but not in Norway and Sweden. Secondly, young people with ill health are more prone to unemployment in Norway and Sweden, but not in Denmark. Previous research has often established health selection as a general phenomenon (Virtanen et al., 2013; Butterworth et al., 2012; Mastekaasa, 1996), and the fact that it only appears among the younger parts of the work force in Norway and Sweden is therefore a bit surprising. Analysis of the Scandinavian labor market has thus revealed some interesting cross-national differences that require a discussion, but first we need to mention a couple of important limitations.

The measures included in this study are *self-reported*, and might therefore be prone to measurement error. It is possible that people overstate their amount of health problems in an effort to rationalize the fact that they are currently unemployed, which potentially could lead to upwardly biased estimates. In addition, there could be some *cultural differences* in how unemployment and ill health is reported in the three investigated countries, while this seems rather doubtful. The Scandinavian countries are astonishingly similar (6.1, 6.3 and 6.4 per cent for men) in the amount of LLSI they report, which might be interpreted as evidence against cultural differences in health perception. The paper has investigates a small subsample, namely people who have both experienced unemployment and ill health. This implies that the *statistical power* is rather low in some model specifications. Lastly, the use of fixed effects analysis does not ensure that the investigated association is a causal one, as it only eliminates potentially biasing time-invariant personal characteristics. In addition, there is some concern that the causal direction could be the reverse (i.e. unemployment causes ill health), since there was not enough power to include a time lagged health measure. Nevertheless, the use of FE models strengthens the belief that the link between ill health and subsequent unemployment is not a spurious association.

Despite these limitations, this study has established that health-based exit from employment is present as a general phenomenon in Denmark, but not in Norway and Sweden. There are two plausible explanations for this cross-national difference. Firstly, the diverging *unemployment trends* implies that the selection into unemployment has probably been different in the Scandinavian countries. Denmark has experienced a *rapidly increasing*

unemployment rate. Because of high over-all demand for labor, individuals with ill health were employed before the crisis, but they lost their jobs during the recession. Sweden, on the other hand, has had a *continuingly high* unemployment rate in the preceding years. The over-all demand for labor has been lower, and people with ill health have probably been employed to a lesser extent. Therefore, the number of ill people inside the labor market is lower, and health-based exit from employment is "constrained" by these circumstances. The fact that young people with LLSI are more prone to unemployment in Sweden might indicate that health selection is quite sensitive to over-all economic conditions. Similarly, in Norway – with a *continuingly low* unemployment rate – there are simply too few individuals that have lost their job for there to exist any systematic health-based exit from employment, except among young workers.

Secondly, the "*Flexicurity*" labor market model could be responsible for the existence of health selection in Denmark. The model ensures that it is rather easy to fire employees, and this could put people with ill health in a precarious position. Employers' potential discriminatory preferences can be expected to play a more central part in such an arrangement, where the costs of firing are lowered. However, there need not be a discriminatory preference behind the lay-off decision: It might as well be seniority rules that are "pushing" those with ill health out of employment. Either way, it seems as if health selection is a driving force in the lay-off process in current-day Denmark, and this could be related to the flexicurity model. It is interesting to note that in 2009 – when Sweden and Denmark experienced roughly the same increase in over-all unemployment rates – there were no health-based exit from employment in Sweden, whereas the opposite was the case in Denmark. One could perhaps interpret this as evidence in favor of the flexicurity explanation. However, it might as well be differing selection *into* employment prior to the crisis that is generating this association, i.e. that people with vulnerable health profiles were employed to a bigger extent in Denmark due to higher demand for labor.

The analysis has established the existence of health selection in Denmark, and health-based exit from employment for young individuals in Norway and Sweden. What does the future hold for these individuals? Unemployment is associated with risk of accumulation of disadvantage over time, both regarding health status (Korpi, 2001) and future labor market attachment. There is a robust statistical association between previous unemployment experience and future risk of unemployment (Eliason and Storrie, 2006) and lower earnings (Gangl, 2006). The scar that is inflicted upon people with a "gap" in their résumé seems to be a hinder for their future labor market attachment (Oberholzer-Gee, 2008). It is therefore essential to reintegrate the unemployed back into the labor market as soon as possible, preferably before the unemployment scar becomes too deep.

Health-based exit from employment can possibly be combated through social policy, but it is difficult to decide what *kind* of policy without better knowledge about which mechanism(s) that are generating the association. Future research on health selection would profit from being more concerned about the mechanisms that are involved. To what extent are employers discriminatory against people with ill health in the recruitment process? Are seniority rules the main reason why people with ill health lose their jobs? These and other important questions remain unanswered.

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Appendix

Table A1
T-tests.

By gender	Denmark		Norway		Sweden	
	t	p	t	p	t	p
Ill health (LLSI)	−5156	0.000	−10,846	0.000	−10,496	0.000
Unemployment	0.827	0.408	0.299	0.765	0.401	0.689
Primary education	−2360	0.018	0.037	0.971	6068	0.000
Secondary education	9704	0.000	7528	0.000	9673	0.000
Tertiary education	−8237	0.000	−6864	0.000	−16,997	0.000

Table A2
Pearson chi square-tests.

By country	Men		Women	
	Chi square	p	Chi square	p
Unemployment	115,005	0.000	112,485	0.000
Educational levels	318,091	0.000	340,630	0.000
Primary education	40,356	0.000	216,541	0.000
Secondary education	314,572	0.000	305,899	0.000
Tertiary education	167,762	0.000	8480	0.014

By gender	Denmark		Norway		Sweden	
	Chi square	p	Chi square	p	Chi square	p
Educational levels	106,886	0.000	65,624	0.000	284,968	0.000
Primary education	5570	0.018	0.001	0.971	36,780	0.000
Secondary education	93,722	0.000	56,577	0.000	93,287	0.000
Tertiary education	67,620	0.000	47,039	0.000	286,237	0.000

Table A3
Result from OLS and GLS regression of unemployment, by ill health, gender, and ill health X gender.

	Denmark		Norway		Sweden	
	OLS	GLS	OLS	GLS	OLS	GLS
Constant	0.027*** (0.003)	0.029*** (0.002)	0.016*** (0.001)	0.017*** (0.001)	0.037*** (0.002)	0.038*** (0.002)
Ill health	0.018 (0.011)	0.014* (0.007)	0.006 (0.005)	0.006 (0.005)	−0.012* (0.006)	−0.006 (0.007)
Woman	−0.003 (0.003)	−0.002 (0.003)	0.000 (0.002)	−0.000 (0.002)	0.000 (0.003)	0.000 (0.003)
Woman × ill health	0.003 (0.014)	0.004 (0.010)	−0.007 (0.006)	−0.007 (0.006)	−0.006 (0.007)	−0.010 (0.009)
R^2	0.001	0.001	0.000	0.000	0.001	0.001
Individuals	7118		12,431		12,470	
Observations	19,349		31,375		30,758	
Significance level	*** = 0.01** = 0.05* = 0.1 NS/(empty) = >0.1					

Reported standard errors (in parentheses) are clustered on individuals.

Table A4
Results from fixed effects (FE) analysis of unemployment (2008–2010) among younger workers, by ill health and covariates.

	Denmark		Norway		Sweden	
	(1)	(2)	(1)	(2)	(1)	(2)
Ill health	0.031 (0.064)	0.028 (0.063)	0.061* (0.035)	0.058* (0.035)	0.086* (0.047)	0.086* (0.048)
Covariates (in addition to individual level and calendar year fixed effects)	None	Age, education, marital status	None	Age, education, marital status	None	Age, education, marital status
R^2	0.011	0.018	0.014	0.014	0.015	0.034
Individuals	1390	1390	3250	3249	3181	3139
Observations	2871	2871	6268	6262	6288	6243
Person/years	114/309	114/309	151/443	151/442	366/986	366/986
Significance level	*** = 0.01** = 0.05* = 0.1 NS/(empty) = >0.1					

Reported standard errors (in parentheses) are clustered on individuals.
Individuals/observations refers to the total sample, while *person/years* is the number of observations contributing to the FE estimates.

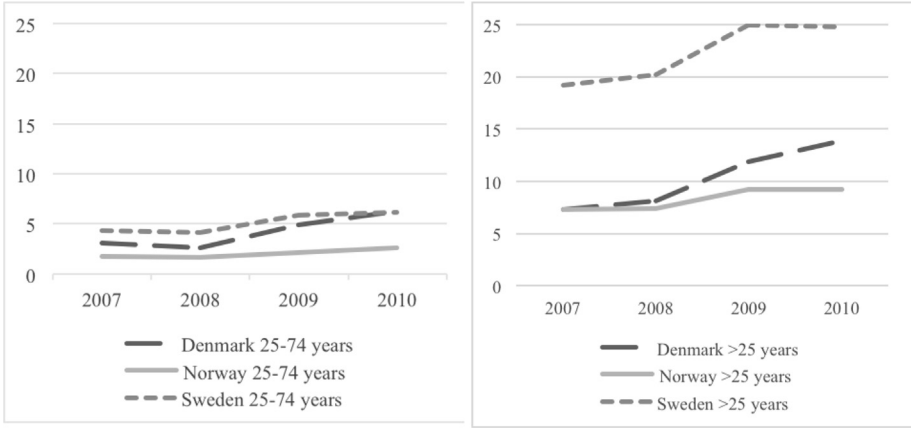

Figure A1. Unemployment rates 2007–2010 by country, for older (left) and younger (right) workers (Source: Eurostat).

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