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Hiring, Firing, and Health – A Cross-National Comparative Perspective

Kristian Heggebø

Avhandling 2016 nr 10

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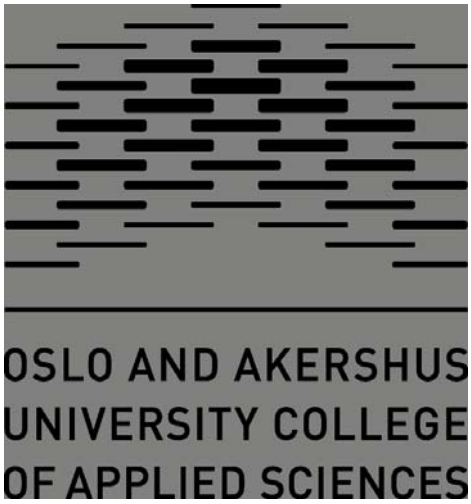

Dissertation for the degree of philosophiae doctor (PhD)
Department of Social Work, Child Welfare and Social Policy
Faculty of Social Sciences
Oslo and Akershus University College of Applied Sciences

Autumn 2016

Avhandling 2016 nr 10

ISSN 1893-0476
ISBN 978-82-8364-033-5

http://www.oda.hio.no

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Skriftserien
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Acknowledgments

There are a large number of people who have contributed – directly or indirectly – to this thesis, and who deserve praise. Working with talented people is the perhaps most exciting part of research, and I am lucky to have had two of the most talented sociologists in Norway as my supervisors: Gunn Elisabeth Birkelund and Jon Ivar Elstad.

Gunn, I would never be in this 'game' unless you gave me the opportunity to participate in the project "Measuring and Explaining Discrimination in the Labour Market" (DISCRIM). During my time as a research assistant (and as a co-author on papers), you showed me how research is done properly. You insist on being thorough, and the analyses should be checked from every possible angle before a conclusion is reached, and afterwards everything should be checked once again, just to make sure. Your attention to details, and devotion to precision and clarity, has helped my research immensely. I very much enjoy your company, and we have had a lot of fun times together. I am going to miss it.

Jon Ivar, I was an admirer of your work before we started working together, and I am even more impressed after seeing you 'backstage'. I have never come across someone who reads as carefully as you do, and your suggestions are always of high quality and 'to-the-point'. Because of our numerous conversations, I know significantly more about what makes a study into a proper contribution. I am still fascinated by all your knowledge, ranging from complex theoretical concepts to advanced statistical analysis techniques. The fact that you are a sucker for sports is also a huge bonus (it makes me feel less guilty for watching sports in the office). You are a great guy, and it has been a real pleasure getting to know you.

I would also like to thank Espen Dahl – the project leader – for your faith in my abilities. Throughout these three years, you have given me the freedom to 'carve out' my own research ideas, as well as excellent suggestions on previous research, conferences, journals and everything in between (such as skiing conditions, and nice fishing spots in Østmarka). I really enjoyed writing a paper together with you, and hopefully we can do more collaborative work in the future. Everyone in our field of research speaks highly of you Espen, and it is easy to understand why.

Some people talk about the solitude and loneliness while doing a PhD, but I can honestly say that I have never felt this myself. There are major advantages associated with being a part of a large – and important – research project, and I have enjoyed it a whole lot. To all my colleagues affiliated with "Health Inequalities, Economic Crisis, and the Welfare

State": Dawit S. Abebe, John E. Berg, Knut Halvorsen, Mari H. Ingelsrud, Trond Petersen, Therese Saltkjel, Anne Grete Tøge, and Kjetil van der Wel, thank you for great teamwork.

I am grateful to Professor Piet Bracke for the opportunity to come and work with him and his team at Ghent University. Veerle Buffel, you are truly a wonderful and talented person, and I look forward to our future collaborative work. Pieter Dudal and Nathan Wittock, you made me feel welcome instantly at the office. I will always remember all the laughs, terrible jokes, and youtube-links we shared. To Ad Coenen, Pieter-Jan De Graeve, Lieselot De Keyser, Katrijn Delaruelle, Rozemarijn Dereuddre, Josephine Foubert, Rachel Waerniers, and many more: thank you so much for a lovely time in my new 'hometown'.

My co-workers at HiOA also deserve a loud and clear "thank you". I have enjoyed my time at Stensberggata, where the atmosphere is very good because of all the amazing people. There are too many of you to name, but I will make two exceptions. To Åsmund Hermansen, my statistical 'partner in crime': Thank you for always being in such a good mood, you make everyone around you feel better. Sanna Simonsson, when you started I 'finally' got a colleague who was both my own age, and who listened to (some of) the same weird music as I do. Thank you for all the conversations we shared, and for laughing at my not-so-funny jokes.

Speaking of not-so-funny jokes leads me to Truls Tømmerås, one of my best friends. We studied sociology together (along with Lisa, Margrethe, and Vida), and both of us went on to do a PhD. I have lost count of the number of analytical problems we have sorted out while enjoying a couple of beers ("et par brune") and listening to The Body, Burial, The Cure, Kiasmos, Swans and Ufomammut in Bjartveien, Bøgata and Fyrstikkalléen. Hopefully there will be more issues to discuss in the future too.

Elisabeth Ugreninov did an excellent job as my opponent on the midway evaluation, and your comments had a very important impact on the dissertation. Jon Rogstad, I really enjoyed working with you at the DISCRIM-project, and I miss our breakfast meetings on Majorstua. Other members of the DISCRIM-family have been important for me as well, most notably Tove Mogstad Aspøy and Heidi Fischer Bjelland.

I am also very thankful for my biological family. There is no place I would rather like to be during Holidays than home in Ølen. Mum and dad, your excellent upbringing is the main reason that I am able to do a PhD in the first place. You taught me early on that I have to work hard in order to achieve good results, and you also showed me the importance of taking time off to enjoy life. It is always a pleasure when you are visiting in Oslo, and you never miss an opportunity to say how proud you are of me. I appreciate this a whole lot, and I

love you very much. My family is really important to me, and it is a pity that I am not able to spend even more time with the people I care about in Bergen, Orstad and Ølen.

Lastly, I wish to thank all my friends (I am not going to name you all, you know who you are). Even though I find my work both interesting and important, most of the things that I do on the day-to-day is quite boring. My friends, however, are everything but boring, and to have all you boys and girls in my life is quite simply a delight. I hope the feeling is mutual.

Summary

To enjoy good health is a fundamental part of human life, as evident by the large number of people who state “my health” when asked what is most important for them. In a similar vein, to take active part in the labor force is essential for individuals, both because it provides income and self-worth, and because it enhances social integration and participation. In fact, having good health and holding a job are two of the most important elements in a person’s life. Hence, the *interrelationship* between health and employment status is of major importance, and this is the overarching topic of the present thesis.

Our point of departure is the empirical observation that the unemployed tend to be in significantly worse health than the employed. This is probably the final product of three processes: (i) a lower likelihood of gaining employment if health status is poor, (ii) a higher unemployment probability when health status deteriorates, and (iii) negative health effects due to unemployment. Correspondingly, the current dissertation investigates health selection in hiring and employment (paper 1), health selection to unemployment (papers 2 and 4) and health effects of unemployment (papers 3 and 5). The data material consists of EU-SILC, and both OLS and GLS regressions, individual level fixed effects, and propensity score matching are utilized in the empirical papers.

In order to get a deeper understanding of the health—employment status relationship, we need to examine how the association varies over time and/ or geographical space. Accordingly, this dissertation will investigate cross-national differences in hiring, firing, and health. *Institutional settings* are the main focus in papers 1, 2 and 3, where research context is set to Scandinavia. Denmark, Norway and Sweden are similar on many domains, but differ on the strength of *employment protection legislation* and on generosity of *unemployment benefits*, both of which potentially important for the association between health and employment status. *Economic conditions*, i.e. the level of and trend in the overall unemployment rate, is the focal point in papers 4 and 5. All available European countries are included (N=28, 25), so that we get as much variation in the economic conditions as possible.

Paper 1 indicates that people with ill health are more likely to be hired in Denmark, where employment protection is weak, than in Norway and Sweden. This pattern is, however, only evident among higher educated people, which is surprising because it is primarily among ‘low skill’ employees that employment protection is weak in the Danish ‘flexicurity’ model. Furthermore, people with ill health are twice as likely (compared to people with good

health) to hold temporary work contracts in Denmark. The 'health component' in temporary work are less evident in Sweden, and especially Norway.

Paper 2 shows that ill health is associated strongly with unemployment likelihood in Denmark, and there are even signs of this being a causal relationship. Health selection to unemployment is not apparent as a general phenomenon in neither Norway nor Sweden, but there is some evidence that younger individuals (<30 years) with poor health have a high unemployment probability in both countries.

Paper 3 examines short-term health effects of unemployment. Sweden have less generous unemployment benefits than Denmark and particularly Norway, perhaps implying larger health effects in Sweden (due to more financial hardship). However, it is apparently only among the unemployed in Denmark that health status tends to deteriorate somewhat. Nonetheless, the findings are quite positive overall for the three Scandinavian countries.

Paper 4 investigates possible compositional changes in the unemployment population in 28 European countries experiencing differing economic conditions. The results indicate that people with good health status constitute a larger part of the unemployed population, but only in countries experiencing a severe economic crisis. In the remaining countries, people with bad health are – if anything – overrepresented among the recently unemployed.

Paper 5 shows that the unemployment event seems to be harmful for self-rated health regardless of how common the experience is, according to analyses of 25 European countries. Low-unemployment countries stand somewhat out empirically (i.e. more pronounced health effects of unemployment), again suggesting that the composition of the unemployed population is crucial for how 'strong' the unemployment—health relationship is.

There are four 'take-home-messages' in this thesis. First, labor market deregulation (weak employment protection and more temporary work contracts) is not beneficial for people with ill health. Second, although people with health problems tend to be among the first to lose their jobs during an economic crisis, stronger employment protection legislation could improve the situation. Third, the Scandinavian welfare states have apparently kept the unemployed in good health, showing the importance of (reasonably) generous unemployment benefits. Fourth, the composition of the unemployed population is of vital importance for why the unemployment—health relationship varies over time and geographical space.

Samandrag

Det er langt frå tilfeldig at veldig mange personar svarar «helsa mi» på spørsmål om kva som er viktigast for dei. God helsetilstand er ein grunnleggande del av eit lukkeleg liv. Å delta aktivt på arbeidsmarknaden er også essensielt for folk, sidan yrkesdeltaking sikrar både inntekt, sjølvrespekt, og integrering i lokalsamfunnet. Å ha god helse samt eit arbeid å gå til er kanskje to av dei viktigaste elementa i ein person sitt liv. Det å undersøke korleis helse, på den eine sida, og arbeidsmarknadsutfall, på den andre sida, heng saman er derfor både viktig og interessant, og det er nettopp det denne avhandlinga skal sjå nærare på.

Utgangspunktet vårt er den empiriske observasjonen at dei arbeidsledige har signifikant dårlegare helsetilstand enn folk som har jobb. Dette er sannsynlegvis eit resultat av minst tre prosessar: (i) lågare sannsyn for å bli tilsett dersom helsa er dårleg, (ii) større sannsyn for å bli arbeidsledig dersom helsa er (eller blir) dårleg, og (iii) negative helseeffektar av arbeidsløyse. Denne avhandlinga skal undersøke desse tre prosessane: tydinga av helsetilstand for tilsetjingar og sysselsetting (artikkel 1), helseseleksjon til arbeidsløyse (artikkel 2 og 4), samt negative helseeffektar av arbeidsløyse (artikkel 3 og 5). Datamaterialet består av EU-SILC, og både OLS/GLS regresjon, individnivå fast effekt, og propensity score matching blir nytta som analyseteknikkar.

For at me skal få ei djupare forståing av forholdet mellom helse og sysselsettingsstatus, treng me å undersøka korleis samanhengen varier over tid og geografisk stad. Denne avhandlinga vil derfor analysere skilnadar mellom land i sysselsetting, arbeidsløyse, og helsetilstand. *Institusjonelle forhold* er hovudfokus i artikkel 1, 2 og 3, der Skandinavia er forskingskonteksten. Danmark, Noreg og Sverige er like på mange områder, men det er viktige skilnadar både med omsyn til styrken på *stillingsvernet*, samt på kor generøse *arbeidsløysetrygdene* er. Begge desse institusjonelle faktorane kan ha ei innverknad på samanhengen mellom helse og sysselsettingsstatus. *Økonomiske forhold*, det vil seie nivå og trend i nasjonal arbeidsløyserate, er fokus i artikkel 4 og 5. Alle tilgjengelege europeiske land vert inkludert (N=28, 25), slik at me får mest mogleg makroøkonomisk variasjon.

Artikkel 1 viser at folk med dårleg helse har større sannsyn for å bli tilsett i Danmark, der stillingsvernet er svakt, enn i Noreg og Sverige. Men dette empiriske mønsteret er berre synleg blant folk med høgare utdanning, noko som er merkeleg sidan det primært er blant 'lav-status' yrker at stillingsvernet er svakt i den danske 'flexicurity' modellen. I tillegg er midlertidig stillingskontrakt dobbelt så vanleg blant folk med dårleg helse i Danmark

(samanlikna med folk med god helse). Det er mindre skilnadar etter helsetilstand i bruk av midlertidig stilling i Sverige, og spesielt Noreg.

Artikkel 2 viser at folk med dårleg helse har stort sannsyn for å vere arbeidsledig i Danmark, og det er ting som tyder på at dette er eit kausalforhold. Helseseleksjon til arbeidsløyse er mykje mindre utstrakt i Noreg og Sverige, men unge personar (<30 år) med dårleg helse er arbeidsledige i nokså stor grad i både land.

Artikkel 3 undersøker (korttids-)helseeffektar av arbeidsløyse. Sverige har mindre generøs arbeidsløysetrygd enn nabolanda, noko som kanskje inneberer større negative helseeffektar her (på grunn av meir økonomiske vanskar). Analysane, derimot, visar at det berre er i Danmark at arbeidsløyse vert etterfølgt av forverra helsetilstand. Samla sett så er resultata temmeleg positive for dei tre Skandinavsike landa, med lite teikn på helsesvikt.

Artikkel 4 undersøker potensielle endringar i komposisjonen av arbeidsløysebefolkninga i 28 europeiske land med ulik makroøkonomisk utvikling. Resultata tyder på at personar med god helse utgjer ein større del av dei arbeidsledige, men berre i land som opplev ei alvorleg økonomisk krise. I dei resterande landa tenderer folk med dårleg helse mot å vere overrepresentert blant dei 'nye' arbeidsledige i krisetider.

Artikkel 5 indikerer at arbeidsløyse er skadeleg for sjølvrapportert helse uavhengig av kor vanleg arbeidsløyseerfaringa er, i følgje analysar av 25 europeiske land. Land med svært låg arbeidsløyserate skil seg, til ei viss grad, ut empirisk (med større negative helseeffektar), noko som igjen tyder på at komposisjonen av dei arbeidsledige er viktig for kor 'sterkt' forholdet er mellom helse og arbeidsløyse.

Det er fire hovudbodskap i denne avhandlinga. (1) De-regulering av arbeidsmarknaden (svakare stillingsvern og meir midlertidige stillingar) er ikkje gunstig for folk med dårleg helse. (2) Personar med dårleg helse er blant dei første som mistar jobben under ei økonomisk nedgangstid, men sterkare stillingsvern ser ut til å forbetre situasjonen. (3) Dei Skandinaviske velferdsstatane har tilsynelatande lukkast ganske bra i å bevare helsetilstanden til dei arbeidsledige, noko som indikerer viktigheita av (nokså) generøs arbeidsløysetrygd. (4) Komposisjonen av arbeidsløysebefolkninga ser ut til å vera av avgjerande tyding når me skal forklara kvifor samanhengen mellom arbeidsløyse og helse varier over tid, og mellom land.

List of abbreviations

ALMP	Active Labor Market Policies
BMI	Body Mass Index
CV	Curriculum Vitae
EPL	Employment Protection Legislation
EU-SILC	European Union Statistics on Income and Living Conditions
FE	Individual Level Fixed Effects
GDP	Gross Domestic Product
GLS	Generalized Least Squares Regression
GP	General Practitioner
GWAS	Genome-Wide Association Study
ILO	International Labour Organization
LIFO	Last-In-First-Out
LLSI	Limiting Longstanding Illness
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares Regression
OR	Odds Ratio
PSM	Propensity Score Matching
SRH	Self-rated General Health Status
WHO	World Health Organization

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Empirical studies

Paper 1.

Hiring, employment, and health in Scandinavia: The Danish 'flexicurity' model in comparative perspective. *European Societies* (2016), 18(5): 460-486.

Paper 2.

Unemployment in Scandinavia during an economic crisis: Cross-national differences in health selection, *Social Science & Medicine* (2015), 130: 115-124.

Paper 3.

Health effects of unemployment in Denmark, Norway and Sweden 2007-2010: Differing economic conditions, differing results? *International Journal of Health Services* (2016), 46(3): 406-429.

Paper 4.

Unemployment and health selection in diverging economic conditions: Compositional changes? Evidence from 28 European countries, *International Journal for Equity in Health* (2015), 14: 121.
Co-author: Espen Dahl

Paper 5.

"The more, the merrier"? Effects of unemployment on self-rated health in 25 European countries with diverging macroeconomic conditions, *European Sociological Review* (re-submitted).
Co-author: Jon Ivar Elstad

1. Introduction

To have good health is a fundamental part of human life. This is evident, for instance, by the large number of people stating "my health" when asked what is most important for them (e.g. see figure 1.6 in OECD 2015, and table 2 in Benjamin et al. 2014). Similarly, to take active part in the labor force is considered to be essential for individuals, because it provides income, self-worth, and social integration. Furthermore, high labor force participation is a key goal for Governments throughout Europe (European Commission 2010). Having good health and holding a job are – in addition to the wellbeing of family and friends – the perhaps most important elements in a person's life. The *interrelationship* between health, on the one hand, and employment status, on the other, is the overarching topic of the current thesis.

Our point of departure is the empirical observation that the unemployed tend to be in significantly worse health than the employed. Health differentials between people inside and outside the labor market contributes vastly towards how large *health inequalities* that exists in a society, which is important from a public health perspective. One could argue, however, that *social class* differences are more important for health inequalities, because working conditions, income level and psychosocial stress are stratified according to where a person is placed within the occupational status structure. A person working on minimum wage and a temporary contract with health-damaging working conditions are obviously more likely to develop health problems than someone holding a safe and highly paid office job. Yet, because of strong competition on the 21st century labor market, people with weak or vulnerable health status are probably – to a large extent – not even a part of the labor force. This issue could become even more pressing when the economy takes a turn for the worse, as we have witnessed in the preceding years in several European countries (Eurostat 2016a). During an economic crisis, the number of available jobs are reduced considerably, and people possessing some kind of 'uncertainty signal' (e.g. bad health) are less likely to be hired, and might even be fired to a higher extent. Thus, the interrelationship between ill health and employment status seems imperative if we wish to understand the 'nitty-gritty' of health inequalities.

Previous research on the unemployment—health association has most often tried to distinguish between two major processes: *social causation* and *health selection*. Social causation refers to a situation where people have bad health because of the (stress surrounding the) unemployment experience, i.e. a negative causal effect of unemployment on health status. Health selection, on the other hand, means that people with a bad (or vulnerable) health status are more likely to be or become unemployed, and this selection is the main reason why the

unemployed tend to be in worse health than the employed. These two processes are not mutually exclusive, and both seem to be of importance for the relationship between unemployment and health (Steele, French & Bartley 2013; Korpi 2001; Elstad 1995).

Although it seems sensible to differentiate between social causation and health selection, there are some challenges associated with this distinction as well. First, health selection is often viewed as a 'statistical problem' that has to be dealt with while investigating health effects of unemployment. It is important to stress that *health-related social mobility* (e.g. health selection into and out of employment), is worthy of empirical investigation in itself. Second, unemployment is a complex phenomenon, and not merely influenced by individuals' current status on health and other observable variables. *Accumulated employment history* (e.g. seniority and firm-specific human capital) is also an important part of the picture. Hence, it is essential to examine hiring and employment, in order to see whether people with health problems are disadvantaged in these domains as well.

The empirical observation that unemployed people tend to be in worse health than the employed is probably the final product of at least[1] three processes: (i) a lower likelihood of gaining employment if health status is poor, (ii) a higher probability of experiencing unemployment when health status deteriorates, and (iii) negative health effects due to unemployment. Correspondingly, the current dissertation will examine health selection in hiring and employment (paper 1), health selection to unemployment (papers 2 and 4) and health effects of unemployment (papers 3 and 5).

Since the health—employment status relationship is reasonably well established empirically, we need to examine how the association varies over time and/ or geographical space in order to get a deeper understanding of the phenomenon. For instance, certain institutional settings are probably able to improve the labor market situation for people with ill health. More knowledge about how and why the relationship varies between countries can thereby be important from a policy point of view. The present thesis wishes to contribute towards this end, using the European Union Statistics on Income and Living Conditions (EU-SILC) data material (time period: 2007—2013) and an explicit cross-national comparative perspective.

[1] Health status might also have an influence on the persons' educational level. For instance, poor health status while studying could cause lower grades, and hence fewer possibilities in school and on the labor market (i.e. too low marks for 'high status' schools and study programs, and/or less job offers after graduation).

More specifically, the association between health and employment status is likely to differ[2] according to the overall *economic conditions*, for two reasons. First, the composition of the unemployed population will probably change for the healthier in high-unemployment countries, and second, it might be easier[3] to cope with unemployment when the experience is widely shared. Country-specific *institutional settings* could also be of major importance, for instance how easy or difficult it is for employers to fire employees with (developing) health impairments. Similarly, generosity of unemployment benefits could also matter for health and wellbeing among the unemployed.

Accordingly, this dissertation will – through five empirical papers – investigate hiring, firing, and health, and how this varies cross-nationally. *Institutional settings* are the main focus in three studies, where the research context is set to Scandinavia (papers 1, 2 and 3). Denmark, Norway and Sweden are similar on many domains, but differ on certain key institutional settings (strength of employment protection legislation, unemployment benefit generosity) that are of importance for the health—employment status link. *Economic conditions*, i.e. the level of and trend in the overall unemployment rate, is the focal point in the two remaining studies (papers 4 and 5). All available European countries are included (N=28 and 25), so that we get as much variation in the economic conditions as possible.

The dissertation is structured as follows. We start with a review of previous research and theoretical mechanisms (chapter 2). Next, the cross-national comparative perspective is outlined, and the research questions are specified (chapter 3). We proceed with a description of data material, key variables, and analysis techniques (chapter 4). The empirical results – derived from the five included papers – are summarized in chapter 5, and we end with a discussion of the presented findings (chapter 6).

[2] The association is likely to differ both *between* countries and within a country *over time* according to changes in the average unemployment rate.

[3] Being unemployed could also be *more* difficult to deal with when the economy takes a turn for the worse, because there is no apparent way out of the unfortunate situation (i.e. low re-employment likelihood). See section 3.2 for more on this issue.

2. Theory and previous research

2.1 Background

This dissertation contributes to the research topic of *social inequalities in health*[4]. Health inequalities usually[5] refer to health differentials by socioeconomic status, such as income, educational qualifications and occupational groups (Eikemo et al. 2016). Often, there is a *social gradient* visible in the relationship of interest, which means that people enjoy better health for each and every step on the societal ladder (Marmot & Wilkinson 2005). Thus, health differentials do not only exist between, for example, the top and bottom 10 percent in the income distribution, but are usually visible on the entire 'hierarchical spectrum'. Health inequalities even persist into old age, as indicated by a Norwegian study showing disposable household income to be significantly associated with health status among people above the age of 65 (Dahl & Birkelund 1997). The present thesis is placed within this wider literature on health inequality, but has a quite 'narrow' focus on the link between employment and health status.

The interrelationship between health and employment status is very important when measuring health inequalities in a society. For instance, Dahl (1993) showed that health inequalities according to occupational status became considerably larger when the previously employed was included in the analysis. This finding can probably be explained by the 'healthy worker effect', i.e. that people with good health status are more likely to remain employed. There could be both demand- and supply side reasons for this. First, employers wish to keep the healthiest (and most productive) employees on the payroll, and those with ill health could therefore be fired during economic slumps. Second, employees with bad health might 'self-select' out of employment, because their health status is not compatible anymore with the work that they used to be able to do. Health-based exit from the labor market is more pronounced within 'low-status' occupational groups because of more health demanding and/or damaging work conditions, and this explains why the inclusion of the previously employed tends to increase health inequalities between occupational status groups. People outside – or on the fringes of – the labor market is therefore an especially interesting group.

[4] See Dahl, Bergsli & van der Wel (2014) for a Norwegian literature review on social inequalities in health, and Elstad (1998; 2000) for theoretical perspectives and explanations.

[5] Health inequalities can be defined in a purely descriptive way, for instance: "a term used to designate differences, variations, and disparities in the health achievement of individuals and groups" (Kawachi, Subramanian & Almeida-Filho 2002).

Previous research has established beyond any reasonable doubt that the unemployed are in worse health than the employed (e.g. Bambra & Eikemo 2009). Broadly speaking, two major explanations have been put forward for why this is so, namely *social causation* and *health selection*. The former implies that health status is poor because of the stress surrounding the unemployment incidence (i.e. a negative causal effect of unemployment on health status). The latter refers to mobility patterns on the labor market, and stipulates that people with ill health have a higher likelihood of being/becoming unemployed. One might differentiate between *direct* and *indirect* health selection processes (Bartley & Ferrie 2001: 778). Direct health selection means that people come to be – or remain – unemployed because of bad health status. Indirect health selection, on the other hand, implies that people become unemployed because of a factor (e.g. certain personality characteristics) that also makes them more disposed to ill health. Both social causation and health selection are important for the link between health and employment status, as shown by Elstad (1995) in a study of Norwegian women.

The unemployment—health relationship is an individual-level phenomenon, but this does not imply that *macro level* factors are unimportant. On the contrary, a whole range of contextual factors are likely to influence the link between health and employment status, the structure of the health care system being one obvious example. A work-related injury could be nothing but a temporary setback for an employee's career in countries with a universal and free (or heavily subsidized) health care system. In countries with extensive out-of-pocket payments, however, the same injury could cause a person to withdraw from the labor market altogether (because the costs of surgery are too high). Preferential employment legislation for the disabled is another example, and labor market participation could be increased by the presence of quotas for people with health problems (in firms of a certain size).

Using a cross-national comparative perspective, the present dissertation will focus on two macro level factors, namely country-specific *institutional settings* and the overall national *economic conditions*. Both of these factors are highlighted by García-Gómez (2011: 210) to be of importance for the relationship between health and employment status. More specifically, the impact of *employment protection legislation* and *unemployment benefit generosity* is the institutional settings being scrutinized. The economic conditions consist of the *level* of and *trend* in the unemployment rate. Before these cross-national differences are discussed more carefully (chapter 3), we turn to previous research and explanatory mechanisms.

2.2 Previous research

We proceed with a brief overview of the existing literature on the individual-level relationship between unemployment and health. Two broad strands of research are relevant for our purpose. First, how people with ill health perform on the labor market, and second, whether health status deteriorates because of the unemployment experience.

2.2.1 Ill health and employment status

Previous research has shown that people with ill health tend to have more difficulties in gaining and holding *employment* than people with good health status. Evidence from the U.K. indicates that people who deteriorate in health have a lower probability of re-employment (García-Gómez, Jones & Rice 2010). Moreover, people with ill health at baseline in the Netherlands were both less likely to stay employed and to return to work after unemployment (Schuring et al. 2013).

Unsurprisingly, people with health problems are disadvantaged regarding *unemployment* and job loss as well. Mastekaasa (1996) finds that people with psychological problems in Norway are more likely to lose their jobs. Suboptimal health status and health behavior predicted both unemployment occurrence and prolonged unemployment in Sweden (Virtanen, Janlert & Hammarström 2013), corresponding well to the results of a previous Swedish study (Lindholm, Burström & Diderichsen 2001). Having poor health is associated with longer time spent unemployed in both Canada (Stewart 2001) and Australia (Butterworth et al. 2012). Furthermore, suffering a sudden deterioration in health increased the unemployment likelihood considerably in Germany (Riphahn 1999). Another German study indicates that the unemployment—health relationship might be *heterogeneous*. Illness and long-term health-related absence was associated with higher unemployment likelihood for foreign and female workers, but there was no such link apparent for native male workers (Arrow 1996).

It could be argued that it is only 'natural' that bad health is associated with weak labor market attachment, because (serious) health problems will make it difficult to perform certain work tasks. Thus, individuals with severe physical limitations and serious mental illness, which are difficult to combine with wage labor, could explain the above-mentioned results. However, similar 'employment penalties' emerge when focus is switched to other health indicators as well, such as *obesity*. Analysis of French survey data showed high body mass index (BMI) to be associated with more years spent unemployed, and with a much lower

probability of regaining employment (Paraponaris, Saliba & Ventelou 2005). A study from Finland using more specific obesity measures indicates that it is especially fat mass (i.e. percent body fat) that is negatively associated with employment likelihood (Johansson et al. 2009). There is even experimental evidence that an obesity signal (i.e. weight manipulated portrait photographs attached to the job application) lowers the call-back probability significantly for both men and women (Rooth 2009). This indicates that it is not only the serious health conditions that matter for labor market participation; other (and less conventional) health signals could play a role as well.

The health—employment status relationship has been examined during economic '*busts and booms*' to some extent in the existing literature. A study from the U.K. found that people with ill health struggled to re-enter the labor market in the aftermath of recessions in 1973–93 (Bartley & Owen 1996), a result that was replicated more recently with a longer observational period (1973–2009) (Minton, Pickett & Dorling 2012). Similar patterns have also been observed in Norway for the years 1980-2005, where people reporting ill health had fairly low employment rates after the economic downturn in the late 1980s/ early 90s (van der Wel, Dahl & Birkelund 2010). This highlights the importance of the overall economic conditions for how 'well' people with bad health perform on the labor market.

Lastly, evidence from 11 European countries indicates that people with good health status are more likely to become – or remain – employed than less healthy people (Schuring et al. 2007). Note that this latter study found noticeable differences in the effect of health on labor market attachment between the included countries. For instance, people with poor/fair self-rated health have, compared to people reporting good health, a high unemployment probability in the Netherlands, Germany and Denmark (OR = 2.7, 2.6 and 2.0), but the association is considerably weaker in Ireland, Spain and Portugal (OR = 0.6, 0.9 and 1.0). This cross-national difference can be considered as our point of departure. Since the health—employment status relationship is reasonably well established empirically, we need to examine how the association varies over time and/ or geographical space in order to get a deeper understanding of the phenomenon. For instance, certain institutional settings or labor market characteristics are probably able to improve the situation for people with ill health. More knowledge about how and why the relationship varies between countries can thereby be important from a policy point of view.

To summarize, there seems to exist a robust statistical association between ill health and employment status: poor health is associated with (i) a lower probability of gaining employment, and (ii) a higher unemployment likelihood.

2.2.2 Unemployment and health deterioration

The next question is whether health status *deteriorates* because of unemployment. This is a slightly more complicated question because 'reverse causation' (i.e. people with ill health or vulnerable health status is selected to unemployment) is a more pressing issue. Previous research has dealt with this challenge in a number of ways, resulting in quite *diverse samples* being used in the analyses. More specifically, some authors have tried to localize a 'natural experiment' in which unemployment is exogenous to the individual, for instance a factory/plant closure (e.g. Iversen & Sabroe 1988). Since *everyone* loses their job when a factory is closed, there is no selection[6] into unemployment on the basis of health, personality or other (unobserved) characteristics. Accordingly, there seems to be a divergence in the existing literature between studies examining 'all kinds' of unemployment incidences (e.g. firing and 'normal' downsizing) compared to the 'exogenous' ones.

Studies examining all kinds of unemployment seem to agree that the unemployment experience is harmful for health. Kessler, House & Turner (1987) generated a subsample of unemployed people who were not at fault for their job loss in order to overcome the possible (health) selection problems in their cross-sectional data. The results indicate significantly worse status on physical illness, anxiety, and depression among the unemployed, compared to the employed. A British study deals with the 'reverse causation' problem through an unemployment measure that pre-dates onset of symptoms (Montgomery et al. 1999), finding unemployment to be a significant risk for depression and anxiety, resulting in medical consultation. Workers losing their jobs during downsizing in Norway are more prone to experiencing symptoms of psychological distress, although the effect seems to be rather short-lived (Østhus 2012). Unemployment remains significantly associated with depression (OR = 1.55) in Australia even after statistical adjustment for social support, financial hardship and sense of personal control[7] (Crowe & Butterworth 2016). Finally, unemployment had a negative impact on the length of time spent in good health in 10 of 13 European countries analyzed, the exceptions being Belgium, France and the U.K. (Cooper, McCausland & Theodossiou 2006).

[6] The factory/plant closure design is, however, not without limitations. First, workers may be are aware of the impending closure some while before it happens, and the most skillful parts of the workforce could be able to 'jump ship' before the closure is a fact. Second, the generalizability is an issue, since manual and 'low-skill' occupations are overrepresented in these studies.

[7] A large number of sociodemographic and health covariates were also included. Having a low sense of personal control over one's life was the covariate most strongly associated with depression in the 'fully adjusted' model (OR = 4.05), followed by being separated/divorced/widowed (OR = 2.89). In other words, employment status seems to be vital for health and wellbeing, but other things are probably even more important.

On the other hand, a handful of econometric studies find no health deterioration because of 'exogenous' unemployment incidences. Analysis of American data indicates no significant effect of job loss (business closures) on health, a finding that is robust across different health measures, model specifications, and subsamples (Salm 2009). Similarly, analysis of German panel data, using plant closures and fixed effects, does not find evidence of a negative health effect (Schmitz 2011). A Danish study, using register data and propensity score matching methods, finds no effect of displacement due to plant closure/downsizing on stress-related diseases of the circulatory- or digestive system (Browning, Moller Dano & Heinesen 2006). Lastly, the unemployment event does apparently not matter for self-assessed health in Finland either (Böckerman & Ilmakunnas 2009), a result obtained with difference-in-difference and matching methods.

In summary, there is a divergence in the existing literature[8] regarding health effects of unemployment, and the discrepancy primarily stems from the samples used: (i) all unemployed individuals, or (ii) individuals unemployed due to an 'exogenous shock'. Which of these two broad strategies is the most appropriate? From a causal inference perspective, a design utilizing an exogenous unemployment shock is desirable, especially while accompanied with stringent econometric modeling. From a policy point of view, however, the strategy of including all unemployed is considerably more appropriate, because a welfare state has to deal with the (potential) health impact of every single unemployment experience. In other words, it is not possible for the health care system to 'exclude' unemployed people who are susceptible to illness.

Almost all of the above-mentioned studies (on both research strands) use data material from one country, although there are some notable exceptions[9] (see García-Gómez 2011; Schuring et al. 2007; Cooper, McCausland & Theodossiou 2006). Hence, we need to examine how the association varies over time and/ or geographical space in order to get a deeper understanding, and cross-national comparative designs can hopefully help us to this end. Furthermore, there has been quite little work on the unemployment—health relationship in changing economic circumstances as well, a topic that is highly relevant given the recent

[8] There is a large body of literature examining the impact of unemployment on *mortality* (see e.g. Lundin et al. 2010; Sullivan & von Wachter 2009; Voss et al. 2004; Martikainen 1990). However, these studies will not be reviewed here because the present dissertation only investigates *morbidity*, measured by 'limiting longstanding illness' (LLSI) and 'self-rated general health' (SRH).

[9] There is also a strand of research that uses data from several countries and multilevel modeling techniques (e.g. Buffel, Dereuddre & Bracke 2015; Buffel, Missinne & Bracke 2016). These studies are not discussed in detail here because they are not explicitly comparative (i.e. country-specific analyses are not shown). Note, however, that these novel papers find few signs of unemployment being less of a health hazard in countries with a high overall unemployment rate, relevant for paper 5 in the current dissertation.

economic crisis in Europe. Consequently, this dissertation adds to the existing literature on two domains. Firstly, by an explicit emphasis on *institutional settings*: employment protection in papers 1 and 2, and unemployment benefits in paper 3. Secondly, through investigating the unemployment—health relationship in diverging *economic conditions* (papers 4 and 5).

2.3 Explanatory mechanisms

As mentioned above, it is well established empirically that the unemployed have worse health on average than the employed. In order to properly explain why this is so, we need to introduce one or several social mechanism(s) that are able to generate this observed statistical relationship (Hedström: 2005: 11; Hedström & Swedberg 1996: 287). Hedström & Ylikoski (2010: 50) states that "proper explanations should detail the cogs and wheels of the causal process through which the outcome to be explained was brought about". We therefore need to introduce a theoretically and psychologically plausible 'link' between our independent and outcome variable(s).

The main aim is to show how one or several mechanism(s) was able to generate the social phenomenon of interest. To do so, we cannot describe each and every detail of the process, and some level of generality is essential. Thus, the mechanism-approach seeks to capture the most important elements of a social phenomenon by abstracting away the irrelevant details (Hedström & Ylikoski 2010: 53). Elster (2007: 36) defines mechanisms as "frequently occurring and easily recognizable causal patterns that are triggered under generally unknown conditions and with indeterminate consequences". It is important to note that explanatory mechanisms quite often are unobserved, or only observable in their (potential) effects (Hedström & Swedberg 1996: 290). One therefore needs a rather deep understanding of the social phenomenon that is being analyzed to be able to 'spot' the mechanism(s) that are producing the observed outcome.

The relationship between employment and health status is a complicated one, and we therefore need to introduce several (potentially important) mechanisms. Note that these mechanisms could reinforce and supplement each other, or perhaps even cancel each other out. For instance, two mechanisms operating in the opposite direction could leave the (false) impression that none of them are active. The mechanisms introduced below will only be used for interpretation purposes, as the current data material is not well suited for more accurate disentangling. It should be stressed, however, that this is not a unique challenge. Most data

materials used within the social sciences are insufficient for *proving* which mechanisms that are the most important driving factor in the statistical associations of interest.

Different mechanisms will be of importance for (i) hiring and firing decisions, and (ii) health effects of unemployment. The most important mechanisms related to both processes will be spelled out in the following, but we start with some basic labor market theory.

2.3.1 Labor market theory

The working of the labor market is driven by *supply* and *demand*. Supply refers to the (number of) available employees, while demand are the vacant positions that needs to be filled. Basically, this is a *matching process*, where employers and employees both search for the 'right one'. The ultimate goal is that employees are matched with employers in a manner that can satisfy the needs of both parts. Employees wish to gain a secure (and interesting) job with an adequate income level. Employers, on the other hand, hope to find a highly skilled and productive employee that will fit smoothly into the existing workplace culture (and a low salary is often preferable due to budgetary constraints). The *reservation wage* of the worker is an important aspect, and the (potential) employee will decline job offers until a satisfying wage level is achieved. Obviously, it is not only income that is important, and similar considerations apply to the exact nature and quality of the job as well (e.g. full time, permanent contract, managerial position, etc.).

During an economic downturn, there is a considerable shift of power in this matching process. With less available job openings (and hence more applicants in the pool), the employer is free to 'pick and choose' to a considerably higher extent. For instance, people with a gap in the résumé might be considered as hirable when labor is scarce, especially if he/she is the only one in the applicant pool who fulfills the qualification requirements. During an economic crisis, however, when the competition for jobs is fiercer, people with a noticeable unemployment 'scar' will probably be less attractive. In fact, all observable *uncertainty signals* are likely to have more of a negative impact on the hiring likelihood when demand for labor is low. This is very important for our purpose, for two reasons. First, bad health status can obviously be considered as an uncertainty signal, and second, many European countries struggled with an economic crisis in the time window examined in the empirical papers (2007-2013).

2.3.2 Hiring and firing

There are five main mechanisms able to explain why people with ill health are disadvantaged in hiring and firing decisions. First, health status could act as a *productivity proxy* during recruitment processes. It is not possible for employers to observe how productive a person is (or will be) if he/she is hired, and employers therefore search for all available (and imprecise) signals (Gambetta 2009; Spence 1973). The most common *human capital* signals (Becker 1993) are educational level, previous employment spells, and relevant certificates/licenses, but health status could also be a factor. In several manual occupations, it is quite obvious that fitness level is relevant for whether the person can do the job or not, but also in non-manual occupations can health be considered to be of importance. A strong (and slim) body can be interpreted as a signal of mental strength and discipline, and therefore have a direct impact on the hiring likelihood.

Second, *risk aversion* will most likely play an important part in hiring decisions (Aigner & Cain 1977). People with poor health have, on average, higher sickness absence, implying both more use of (less productive) substitute workers, and a larger workload on the remaining staff. There is also a possibility that the person with ill health will deteriorate further in health, perhaps to the point where he/she is not fit enough to do the job anymore and therefore have to resign. In that case, the employer must spend time and energy on a new (and expensive) recruitment process. Thus, there is less risk involved in hiring someone with good health status.

Third, a person with bad health could be disadvantaged because of the *scarring effects of unemployment* (Birkelund, Heggebø & Rogstad 2016; Eriksson & Rooth 2014; Oberholzer-Gee 2008). Employers will probably favor people with a seamless employment history, which is interpreted as a high-productivity signal. In other words, employers could be indifferent to health status per se, but rather worry about the accumulated amount of non-employment on the CV. People with ill health are likely to have more disruptions in their employment record, for two reasons. First, the person with health troubles could have struggled to gain employment in previous recruitment processes. Second, the poor health status might have forced him/her to be outside the labor force for a considerable amount of time (e.g. due to hospitalization).

Fourth, some employers might even act *discriminatory* against people with health problems during recruitment processes. The discrimination could be *preference-based* (Becker 1971), implying that the employer would actively prefer to hire someone with good

health. However, *statistical discrimination* (Phelps 1972) is probably more common: i.e. an employer believes that poor health is correlated with other undesirable personality characteristics (e.g. weakness of will), and therefore choses someone with good health instead. Statistical discrimination and risk aversion have clear similarities (both rely on productivity assumptions), and these two mechanisms might thus overlap to a high extent.

Fifth and finally, last-in-first-out (LIFO) *seniority rules* are probably vital when deciding whom to fire (Von Below & Thoursie 2010; Lindbeck 1994). When redundancies are made, employers need some kind of 'guiding principle' that is considered reasonable and just among the employees. The length of the employment relationship, an indicator of firm-specific human capital, is a commonly used principle. Due to the four above-mentioned mechanisms, people with health problems are disadvantaged in recruitment processes, and will therefore have less seniority[10] on average. This 'seniority penalty' is probably the most important reason why ill health is associated with increased unemployment likelihood during a crisis. Analysis of data from Germany and the U.K. suggests that this mechanism could be essential, finding that immigrants (who often struggle to gain employment as well) are more prone to dismissals than the majority population during economic downturns (Dustmann, Glitz & Vogel 2010).

Note that employers, most often, can depart from using seniority rules, for instance if a newly hired employee have unique skills that are essential for the survival of the firm. Hence, there is some flexibility in the system, and employers could take the opportunity to shred workers who are considered to be unproductive. This means that people with poor (or deteriorating) health status – a proxy for productivity – could tend to lose their jobs even though their seniority levels are high. There is, in fact, qualitative evidence of sickness absence being used as a criterion during downsizing in a Danish factory (Svalund et al. 2013: 194), indicating that health status could be of importance.

Throughout this discussion, it has been an assumption that health status is a signal that employers will act upon, but we do not know the extent to which this is true. Evidence from field experiments show that employers do indeed notice – and act upon – available signals in CV and application letters. Both unemployment experience (Birkelund, Heggebø & Rogstad 2016; Eriksson & Rooth 2014; Oberholzer-Gee 2008) and a non-native sounding name (Blommaert, Coenders & Tubergen 2014; Bursell 2014; Carlsson & Rooth 2007) are causally

[10] Seniority increases with age (if the employee stays with the same employer), and old age is correlated with ill health. Thus, it could, to some extent, be challenging to disentangle the 'protective effects' of seniority from the 'damaging effects' of old age while examining the impact of health on labor market outcomes.

related to a lower likelihood of positive response from employers. Correspondingly, (deteriorated) health status will probably have an impact on hiring outcomes as well. In fact, there is experimental evidence that an obesity signal lowers the call-back probability (Rooth 2009), and bad health is therefore likely to have a negative effect as well.

A second assumption is related to the employer's ability to properly observe health status, given that it is illegal to ask about health-related questions[11] (and previous sickness absence) during job interviews in several European countries. Nevertheless, employers can rely on more imprecise health indicators while interviewing candidates, such as being obese/underweight, or shortness of breath. In addition, more serious health impairments will probably manifest itself as résumé gaps, for instance if surgery has caused a person to be outside the labor force for a considerable while.

It is important to stress that the data materials used throughout this dissertation are not well suited for distinguishing between these five mechanisms. We are not able to directly observe the outcomes of hiring or firing decisions (as in a field experiment), and there is no information on the exact reasons emphasized by the employer. Moreover, we have no way to measure the degree of 'credential mismatch' either: i.e. whether people with ill health have to accept a position below their qualification level because of difficulties in gaining employment. We need to remember these limitations while interpreting the results.

2.3.3 Why is unemployment harmful for health?

In this section, attention is turned to *why* the unemployment experience is harmful for health, but first we need to answer *how* unemployment even would be able to. There is some evidence that a spell of unemployment has an impact on physical health. The unemployed tends to have elevated levels of *C-reactive protein* several years after first experiencing unemployment (Janicki-Deverts et al. 2008). C-reactive protein is found in blood plasma, and it rises in response to inflammation. In addition, a significant increase in *cortisol levels* has been found among long-term unemployed people (Maier et al. 2006). An increased cortisol level suppresses the immune system, thereby making a person more susceptible to illnesses.

[11] This depends to some extent on the specific job applied for. It could, for example, be appropriate to ask about physical abilities if it is a physically demanding job, e.g. "Are you able to lift packages weighing 20 kg?". However, health-related questions that are not directly relevant for the job tasks are usually not allowed (see e.g. The Norwegian Working Environment Act, *Section 9—3*: Obtaining health information on appointment of employees).

Lastly, people experiencing lay-off[12] have worse health as indicated by biomarkers, for instance cholesterol, glycosylated hemoglobin, and high-density lipoprotein (Michaud, Crimmins & Hurd 2016). Yet, to what extent the unemployment experience is the (single) *cause* of these physical reactions remains uncertain.

The most important health consequences of unemployment are probably due to mental rather than physical processes, at least in the short-term. Holding a job provides a number of positive features – in addition to income – important for health and wellbeing. These are commonly referred to as the *latent functions* of work (Paul & Batinic 2010; Jahoda 1982; Jahoda, Lazarsfeld & Zeisel 1974). Employment provides activity, time structure, social contacts, collective purpose, and social status, and a loss of job will, in many cases, involve a loss of these functions as well. For instance, if the person's identity is very closely connected to his/her occupation, then a job loss will probably be quite upsetting. Similarly, if a person has a lot of friends and acquaintances at the previous workplace, but quite few social connections otherwise, then a job loss could be followed by loneliness. Hence, there is good reason to expect negative mental health effects of unemployment.

There are three main mechanisms that can explain why an unemployed person deteriorates in health. Firstly, because of *financial hardship* (Nordenmark & Strandh 1999: 583). Becoming unemployed will, under normal circumstances, lead to a considerable drop in income. The unemployed are therefore less able to pay for nutritious meals, and might even be forced to forego health care expenditure (e.g. medication, visits to the GP) and/or move to a residence of reduced quality (e.g. more exposure to air pollution). Furthermore, ever-present worries about the ability to 'make ends meet' will likely impose a lot of stress on the unemployed, with unforeseen expenditures able to cause their entire budget to collapse.

Secondly, due to *stigma[13] and self-blame*. Losing your job is a signal that you are not an important part of the 'team', because employers wish to keep on the pay-roll[14] employees who are vital for the future survival of the company. The recently unemployed might therefore blame themselves, and feel embarrassed that they are now currently out of work.

[12] People losing their jobs due to *business closure* do not have worse health as measured by biomarkers, probably because this unemployment sample is less 'negatively selected' on health status and health-relevant characteristics (see section 2.2.2).

[13] It is sensible to distinguish between *personal stigma* on the one hand, and *stigmatization* on the other (Baumberg 2016: 183). The former is related to how a person him-/ herself feels about being unemployed, whereas the latter is the perception that other people will devalue your identity as 'someone without a job'. Hence, an unemployed individual could worry about other people's judgment, while not personally feeling ashamed about being unemployed.

[14] This is obviously different when the entire company/plant is closed, and everyone is made redundant. Feelings of failure could nonetheless be apparent if these individuals struggle to gain re-employment.

Correspondingly, previous research has shown that unemployment is associated with feelings of inferiority, failure and shame (Walker et al. 2013; Rantakeisu, Starrin & Hagquist 1999). Unemployed individuals could also become increasingly anxious as the unemployment incidence persists. Not being able to gain re-employment, and the accompanying feeling of personal rejection in several recruitment processes (Sharone 2013), will probably have a negative influence on mental health, for instance through lowered self-esteem. This could trigger a 'vicious circle', where the person grows less confident for each rejection, which again makes it more likely that he/she is rejected in future recruitment processes. Hence, it is not only on the demand side that unemployment can impose a scar (i.e. employers' skepticism about CV gaps); being unemployed can affect the supply side as well.

Thirdly and lastly, *health behavior* could change negatively among the recently unemployed. Increased alcohol and cigarette consumption, both of which harmful for health, could possibly act as a coping mechanism for some people. The unemployed could also be inclined to overeat, and perhaps eat more unhealthy food (due to drop in income), causing an increase in body fat. Without the time structure provided by the previously held job, the sleep patterns of the unemployed could change for the worse as well. It seems reasonable to expect that the *price* of the products are relevant for how much the consumption patterns will change (Ásgeirsdóttir et al. 2014), especially if an unemployment episode is followed by a large income decline. Similarly, whether the (health-relevant) activities are *time-consuming* or not is probably important (Xu 2013). For instance, binge drinking is quite time-consuming, and might therefore become more prevalent among the unemployed.

It is, however, difficult to forecast whether the (potential) changes in health behaviors will result in negative or positive consequences. Accordingly, previous empirical evidence is mixed on whether health behavior acts as an important mediating factor or not (see Xu 2013: 126-127 for a summary). There could, in fact, be a number of *positive* aspects associated with the unemployment experience. While out of work, individuals have more time to exercise and to prepare healthy meals (if the groceries are affordable). Moreover, consumption of health-damaging goods, such as alcohol and cigarettes, might decline because the unemployed have less money to spend. It is also likely that there is considerable heterogeneity according to the quality of the job previously held (Halvorsen 1998). For example, if the previous job involved health-damaging work conditions and/or was of a temporary and insecure kind, becoming unemployed might be followed by an improvement in health.

The potential positive health effects of unemployment (for certain displaced workers) are probably only relevant in the short term. Long-term unemployment, with accompanying

financial hardship and feelings of insecurity, is likely to be harmful for health. Furthermore, the negative aspects (e.g. income drop and feelings of inferiority and shame) of unemployment probably outweigh the positive ones.

Unfortunately, the available health information is not detailed enough in order to establish why health (potentially) deteriorates among the recently unemployed. Furthermore, we are only able to investigate whether health deteriorates in the *short-term*, due to the panel structure of the EU-SILC data material where people are followed for a maximum of 4 years. The more long-term health consequences of unemployment during the economic downturn in Europe are hence left for future research.

We end this section with a short discussion of a potential gender component in the health effects of unemployment. Some argue that women are less likely to deteriorate in health due to job loss than men, for two major reasons (Cohn 1978: 86-87). Firstly, because of *differential socialization*, where men are taught that employment is an integral part of adulthood, whereas women learn that they can live fulfilling lives without being part of the labor force. This causes men and women – on average – to value employment differently. Secondly, unemployment hurt women less because of *alternative role availability*. Women can enjoy meaningful roles outside the labor market as a wife and mother, but 'only' being a husband and/or father is not satisfying enough for a man. These explanations for gender differences in health impacts of unemployment seem rather dated, especially given the large labor force participation among women in most countries in current-day Europe. Furthermore, men take greater responsibility in both household chores and child rearing now, and the differences between men and women are therefore less distinct than they used to be. Thus, it is unlikely that unemployment hurts less for women than for men.

3. Cross-national differences

Most previous work on the relationship between ill health and employment status is centered on data from one country (see García-Gómez 2011, Bambra & Eikemo 2009, and Schuring et al. 2007 for notable exceptions), and the present dissertation contributes to the existing literature with an explicit *cross-national comparative perspective*. By examining how the relationship varies over time and geographical space, we will hopefully be able to expand our understanding of the association between health and employment status. In this section attention is turned to (i) institutional settings and (ii) economic conditions, and why we expect these factors to be important for the health—unemployment relationship.

The overall *economic conditions* are of special importance given the economic downturn that hit European countries with diverging strength in the aftermath of the US housing market collapse 2007/2008. The crisis can be seen as a kind of 'natural experiment' (Reeves et al. 2014) that provides us with an opportunity to study cross-national differences in the health—unemployment relationship. In addition, we will examine the impact of *institutional settings* through a 'case study' of the Scandinavian countries (Denmark, Norway and Sweden), which is the topic of the subsequent section.

3.1 Institutional settings in Scandinavia

There are a number of institutional settings important for the unemployment—health relationship, and this thesis will examine two of these in-depth, namely *employment protection* and *unemployment benefits*. The research context is here set to the three Scandinavian countries: Denmark, Norway and Sweden. The reason for this choice is twofold. First, these countries are organized in a quite similar fashion, and cross-national heterogeneity is thus kept to a minimum. All three countries have high tax levels, universal health care systems (with few payments out-of-pocket), and free or heavily subsidized educational systems (including higher education). Furthermore, there is an emphasis on egalitarian values throughout Scandinavia, and income inequality is on a comparatively low level in 2012, with a Gini coefficient of 0.25 in Denmark and Norway, and 0.27 in Sweden (OECD 2016a). The compressed wage distribution in Scandinavia is partly due to high prevalence of unionization and collective bargaining. Social-democratic political parties remained in power for long periods after the Second World War, and this helps explain why the countries are so similarly organized.

Denmark, Norway, and Sweden are quite similar on how the labor market is structured. The employment rate for 20-64 year olds in 2010-2014 was roughly 79-80 percent in Norway and Sweden, and 76 percent in Denmark (Eurostat 2016b). The degree of temporary work in the same age- and time span is approximately 7-8 percent in Denmark and Norway, but on a higher level – at roughly 14 percent – in Sweden (Eurostat 2016c) due to legislative amendments in 2003 and 2007 (Dølvik et al 2015: 69). Share of public sector employees is similar in 2012: 32.6 in Sweden, 33.6 in Denmark and 35.4 percent in Norway (Dølvik et al 2015: 63). The industries of the three Scandinavian labor markets are in fact very similarly structured overall (Nordic statistical yearbook 2014, table 8.2), except for the somewhat larger service sector in Sweden (15.2 percent) than in Denmark (11.2 percent) and Norway (11.4 percent). Clearly, the similarities are much more pronounced than the dissimilarities, which is an obvious strength from a comparative point of view because we are not comparing 'apples and bananas'. For example, it would be very challenging to compare results drawn from countries with varying degrees of 'shadow economy'.

Nevertheless, there are certain noticeable differences between Denmark, Norway, and Sweden too, which is the second reason why Scandinavia is well suited as a 'case study'. We need some variance in the institutional setting in order to justify the comparative design. The most apparent difference is related to the Danish 'flexicurity' labor market model, where employment protection is considerably weaker than in the neighboring countries. Furthermore, Sweden changed their unemployment benefit regulations in 2007, resulting in both lower replacement rates and fewer people being eligible for benefits (Lorentzen et al. 2014: 47-48). The main idea is therefore to compare countries that are very similar, except from certain key differences on institutional settings. Hence, the path chosen here is a variant of the 'most similar systems design' common within comparative politics, inspired by John Stuart Mill (1843: 454-455).

3.1.1 'Flexicurity' and employment protection

The first institutional setting is firmness of the *employment protection legislation* (EPL). Labor market *deregulation* have been implemented in several European countries since the 1990s (Gebel & Giesecke 2016), and weaker employment protection is the perhaps most common policy instrument. There are two main perspectives on how deregulation will influence labor market attachment for 'vulnerable groups' (Gebel 2010). The *integration* perspective emphasizes that deregulation could be positive for 'vulnerable groups' (e.g. the

young), whereas the *segmentation* perspective underscores that differences between 'insiders' and 'outsiders' could become even larger. EPL could, in fact, prove to be very important for labor market attachment among people with ill health. The reasons why will be spelled out shortly, but first we need to devote some attention to the so-called 'flexicurity' model, our point of departure.

The Danish 'flexicurity' labor market model consists of three major parts (Van Kersbergen & Hemerijck 2012; Heyes 2011). *First*, job protection is quite low, and it is rather easy for employers to fire employees. This ensures that firms and companies are able to effortlessly adjust to economic shocks, and the flexible system is supposed to help the businesses survive. *Second*, the unemployment benefits are quite generous, so that employees are 'taken good care of' while out of work. This can be seen as a compensatory system: the average Danish worker has high unemployment likelihood, but he/she will be able to maintain a good standard of living while unemployed. *Third*, the use of active labor market policies (ALMP) is widespread, in an effort to reintegrate the unemployed back into the labor force as soon as possible. This is reflected by public expenditure on ALMP as a percentage of gross domestic product (GDP), which is considerably higher in Denmark (1.96) than in Sweden (1.11) in the year 2011 (OECD 2016b), even though the unemployment rate was similar (7.6 in Denmark and 7.8 in Sweden).

It is very important to stress that there is a noticeable *skill component* in the Danish 'flexicurity' model (Jensen 2011). It is primarily among 'low-skill' workers that employment protection is weak, and the jobs of traditional 'white collar' employees are more strongly protected. For instance, some employees only have 5-6 days' notice period, while others have 6 months. The skill component is reflected in the 'compensatory system' as well. In a nutshell, low-skill workers have weak employment protection, but generous unemployment benefits, while high-skill employees have stronger job protection, and less generous unemployment benefits. This duality is probably the main reason why Denmark (2.10) does not differ markedly from Norway (2.23) and Sweden (2.52) in 2013 on the employment protection index for individual dismissals for permanent workers (OECD 2016c).

From a comparative point of view, it is particularly on the weak employment protection legislation that Denmark stand out, since the job protection is considerably stronger in both Norway and Sweden. One could argue that Denmark is different on the use of ALMP as well, and this is to some extent true. However, the similarities between the Scandinavian countries are far more pronounced than the differences. For instance, among 30 OECD countries, it was only the three Scandinavian ones, alongside Poland and Switzerland, who

spent more on active- than on passive labor market measures in 2011 (OECD 2016b). There are also some nuances between Denmark, Norway, and Sweden in generosity of unemployment benefits, to which we return later in this chapter. For now, we consider the potential effect of employment protection legislation (EPL) for labor market attachment among people with health problems.

The more flexible hiring and firing regulations lead to a higher worker- and job turnover rate (Andersen & Svarer 2007; Madsen 2004), and there is thus some resemblance between the Danish model and the U.S. labor market. In other words, the *mobility rates* are quite high overall in Denmark (i.e. employees change jobs rapidly), which means that Danish workers are involved in more hiring- and firing processes on average than their Norwegian and Swedish counterparts. If people with ill health are disadvantaged during recruitment processes and in firing decisions (see section 2.3.2), they could be worse off in Denmark because of *cumulative disadvantages* (DiPrete & Eirich 2006; Merton 1968). Cumulative disadvantage highlights the importance of *path dependency* where initial inequalities in certain resources (e.g. health or employment experience) grow over time (Leopold 2016: 258). This process – also known as the Matthew[15] effect – is probably crucial in the labor market for people who possess an 'uncertainty signal', such as poor health status.

An example might clarify: A person with ill health (hereby *H*) struggles to gain employment after graduation, and accumulates some unemployment on the CV. *H* eventually get a job, but the firm is struck by an economic shock after a short while, and needs to dismiss workers. *H* is fired due to low seniority, and has to search for a new job. *H* struggles to gain employment once again, both because of the bad health status and the 'unemployment scar'. This 'vicious circle' continues, and *H* ends up with a rather loose labor market attachment. Note that, in this stylized example, *H*'s labor market attachment gets worse, the more hiring and firing processes he/she is a part of (at least compared to the continuingly employed of similar age and skill level). This means that *H* will, ceteris paribus, be more disadvantaged if he/she lives in Denmark, because the mobility rates are higher there.

Furthermore, the strength of EPL might have an impact on the *candidate ranking* during hiring and firing decisions. Aware of the flexible legislation, employers might be more prone to take the 'risk' associated with hiring someone with a health impairment. If he/she turns out to be a bad match for the company (e.g. has too many sick days, or deteriorates further in health), the person can simply be sacked, without the employer having to worry

[15] "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken even that which he hath" (Matthew 25:29).

about any major costs involved in doing so[16]. This is especially the case in 'low-skill' labor market segments, where both notice period and severance pay is limited. Hence, Danish employers could be more inclined to give people with bad health an opportunity than their Norwegian and Swedish counterparts, because the EPL is stronger in the latter two countries. On the other hand, the presence of weak EPL could perhaps be of minimal importance for candidate ranking. Employers wish to hire *the best possible* candidate in each and every recruitment process, and he/she will therefore try to keep the associated risk factors at a minimum. Employers tend to go for the safest choice, perhaps implying that people with poor health are equally disadvantaged in the hiring processes regardless of the country-specific strength of EPL.

It is therefore difficult, from a theoretical stance, to predict how weak EPL will impact on hiring decisions for people with ill health. It is considerably less complicated regarding dismissals. Weak EPL will most likely increase the firing likelihood of people with health problems, because the poor health status represents a risk factor from the employer's point of view. During redundancies, employers wish to keep the most productive employees. People with a bad (and/or deteriorating) health status will tend to have higher sickness absence, and could also be less physically fit to do the job at hand. Thus, if firing legislation is flexible enough, those with poor health will probably be among the first to be let go. Correspondingly, a recent study of 26 European countries found that stricter EPL was associated with lower firing likelihood among people with health problems, but only in countries experiencing a less serious or no economic crisis at all (Reeves et al. 2014). Recall that sickness absence was used as a criterion in a Danish factory during downsizing (Svalund et al. 2013: 194), further indicating that health status could be a relevant factor.

In summary, the strength of EPL could matter for labor market outcomes among people with health problems for three reasons. Firstly, because of higher *mobility rates* overall, possibly implying cumulative disadvantages due to participation in more recruitment processes. Secondly, because of an altered *candidate ranking* during hiring processes, i.e. people with ill health are more likely to be hired because the associated risks are lower when it is easy to fire employees. Thirdly, because of a higher *unemployment probability* when employment protection is weak. The impact of employment protection legislation is scrutinized by asking the following two research questions:

[16] Note that *probationary period* is used as a 'screening device' in many occupations, and weak EPL might therefore be superfluous in many cases (i.e. the unproductive employee can be fired during the probation).

1. Are hiring- and employment- prospects better for people with health problems in Denmark, where the employment protection legislation is weaker?
2. Do people with ill health have a higher unemployment likelihood in Denmark, compared to Norway and Sweden?

3.1.2 Unemployment benefits

The second institutional setting relevant for the unemployment—health relationship is *unemployment benefit generosity*. Although it is obvious that the benefit level has an impact, it is not straightforward *how* it will have an impact. If the benefit is generous and duration long, the unemployed could have an incentive to not search (seriously) for a new job (Carling et al. 1996; Katz & Meyer 1990). This will imply longer unemployment episodes, which probably will make it harder to re-join the labor force due to the scarring effects of unemployment (i.e. employers are skeptical about people with large CV gaps). Furthermore, the longer the unemployment spells, the more human capital depreciation, which also will lower the probability for re-employment. Hence, an ungenerous benefit level could be a good idea to ensure that the unemployed return to the labor market as soon as possible.

The story is complicated, however, by the fact that a very meager benefit level could 'force' people into accepting jobs that are below their proper skill level, perhaps implying work conditions of worse quality and lower life-time earnings. A low unemployment benefit level could cause a mismatch between employers and employees, and hence less efficient use of the available human capital resources (from a societal point of view). It is also important to emphasize that rather generous unemployment benefits could help the unemployed in staying fit and healthy. If the benefit is very meager, on the other hand, unemployed people must prioritize their spending, and (expensive) medication, GP visits, and healthy groceries could be sacrificed. Thus, the health status of the unemployed could be affected negatively by an ungenerous benefit, and it is this latter possibility we discuss in the following.

Financial security is vital for health and wellbeing in general, and might be particularly important during an unemployment episode. Generosity of unemployment benefits could therefore prove to be an important 'tool' while combating health hazards of unemployment, as indicated by previous research (Rodriguez 2001; Rodriguez, Lasch & Mead 1997). Important for our purpose, there is some divergence in Scandinavia on this institutional setting: the net replacement rate is on a considerably lower level in Sweden compared with the neighboring countries. For instance, a single person without children on

average wage would in 2014 get 58 (Denmark), 65 (Norway) and 42 (Sweden) percent of previous income level during the initial phase of unemployment (OCED 2016d). In addition, Sweden altered its policies in 2007, resulting in considerably fewer individuals being eligible for benefits (especially pronounced among former students) (Lorentzen et al. 2014: 47-48).

Thus, it might be the case that unemployment is related to more health deterioration in Sweden than in Denmark and Norway, because the probability of experiencing some level of financial hardship is higher in Sweden. However, we need to remember that unions and collective agreements play a more important part in the Swedish institutional setting (Sjöberg 2011: 223-224), and the OECD (2016d) replacement rates might therefore overestimate the cross-national differences to some extent. In other words, the unions will most likely 'buffer' a considerable amount of the income loss experienced by the unemployed through private unemployment insurance funds. This is worth recalling while interpreting the results, which hopefully will give us the answer to the third research question of this thesis:

3. Are the negative health effects of unemployment more pronounced in Sweden, where the unemployment benefits are less generous than in Denmark and Norway?

The three research questions asked thus far focus on employment protection and unemployment benefits. There are, however, other institutional settings that could be vital as well, and we briefly comment on some of these in the following. The amount and efficiency of *active labor market policies* (ALMP) could affect how fast people with ill health return to work. In addition, both *disability pension* utilization and *retirement* regulations will probably be of importance. For instance, if the disability pension[17] is more generous than the unemployment benefit, people with ill health could tend to prefer the former. How easy it is to opt for (early) retirement, and the associated income level, could also be imperative for labor market attachment among people with poor health. *Sickness absence* regulations are probably especially important for people with poor health status. If the employers have to pay (large parts of the) salaries when employees are on sick leave, the employers will most likely be more reluctant to hire (and perhaps more inclined to fire) people with health problems. Other factors not mentioned here might have an impact as well.

[17] See table A1 in paper 1 for disability prevalence for people reporting ill health in Denmark, Norway and Sweden. Swedes with bad health status report 'disabled' as economic status to a somewhat lesser extent than their neighboring counterparts do, which is probably a reflection of the stricter eligibility criteria for disability benefits introduced in recent years (Hägglund 2013; Lidwall 2013).

Naturally, it is beyond the scope of this dissertation to examine all of the above-mentioned factors, and uncertainty remains as to the role they play in the unemployment—health relationship. However, the Scandinavian countries are quite similar on all these institutional settings, so they are unlikely to bias the cross-national comparative results much. In paper 1 and 2, *employment protection* is center of attention, while *unemployment benefit generosity* is scrutinized in paper 3. The cross-national differences in these two institutional settings are summarized in table 1.

Table 1. Summary of institutional differences in Denmark, Norway and Sweden

	Strong employment protection?	Generous unemployment benefits?
Denmark	No	Yes
Norway	Yes	Yes
Sweden	Yes	No

Next we widen our 'comparative gaze' to Europe, and ask whether (differing) economic conditions are of significance for the individual-level association between unemployment and health.

3.2 Economic conditions in Europe

The second major cross-national difference scrutinized in this dissertation is the overall *economic conditions*. Some countries have experienced mass unemployment during the economic crisis, with unemployment rates skyrocketing to roughly 20 percent (e.g. Greece and Spain). Other countries have been more or less unaffected, and the unemployment rate stayed very low throughout the investigated time window (e.g. Norway). Bartley (1988: 63) argues "that a greater understanding of the economic issues of labour supply and demand . . . is necessary in order to advance further in understanding the interrelationship between unemployment and health". But why should economic conditions matter for the unemployment—health relationship? There are three major reasons, the first of which being a potential change in the *composition* of the unemployment population.

When demand for labor is high, those making up the unemployment population are probably a selected group on a number of personal characteristics. They will often have low educational level and bad health status, and they are quite possibly disadvantaged on unobservable features too (e.g. personality characteristics and cognitive abilities). This probably changes, however, as the economy takes a turn for the worse. Now, productive and

high-skill individuals with good qualifications might lose their jobs – and stay unemployed – as well (e.g. due to downsizing and plant closures). We can expect such 'high-skill' unemployed individuals to both have better coping skills and more healthy behavior, implying that they are less likely to deteriorate in health. Moreover, these 'high-skill' unemployed are less likely to have had physically demanding labor in the past, and health status will thus tend to be better before joining the unemployment population. In sum, the unemployment—health relationship will be weaker when labor demand is low due to a changed composition of the unemployment population.

Secondly, there might be less *self-blame and stigma* associated with the unemployment experience when it is more widely shared. It is possible that it is harder to put up with unemployment when few others are unemployed (Clark & Oswald 1994: 657), and perhaps it feels more like a personal failure (Turner 1995: 215). This tendency is sometimes referred to as 'the social norm of unemployment' (Clark, Knabe & Rätzel 2010; Clark 2003), which highlights the importance of contextual factors. The economic conditions have an impact on whether being unemployed is considered to be a *personal* or a *structural* problem. Being unemployed can be considered as more of a personal failure when the unemployment rate is low, and 'everybody else' holds a job. Hence, if the unemployment experience is viewed as "a true reflection of the self" (Cohn 1978: 90), the health effects could be more pronounced.

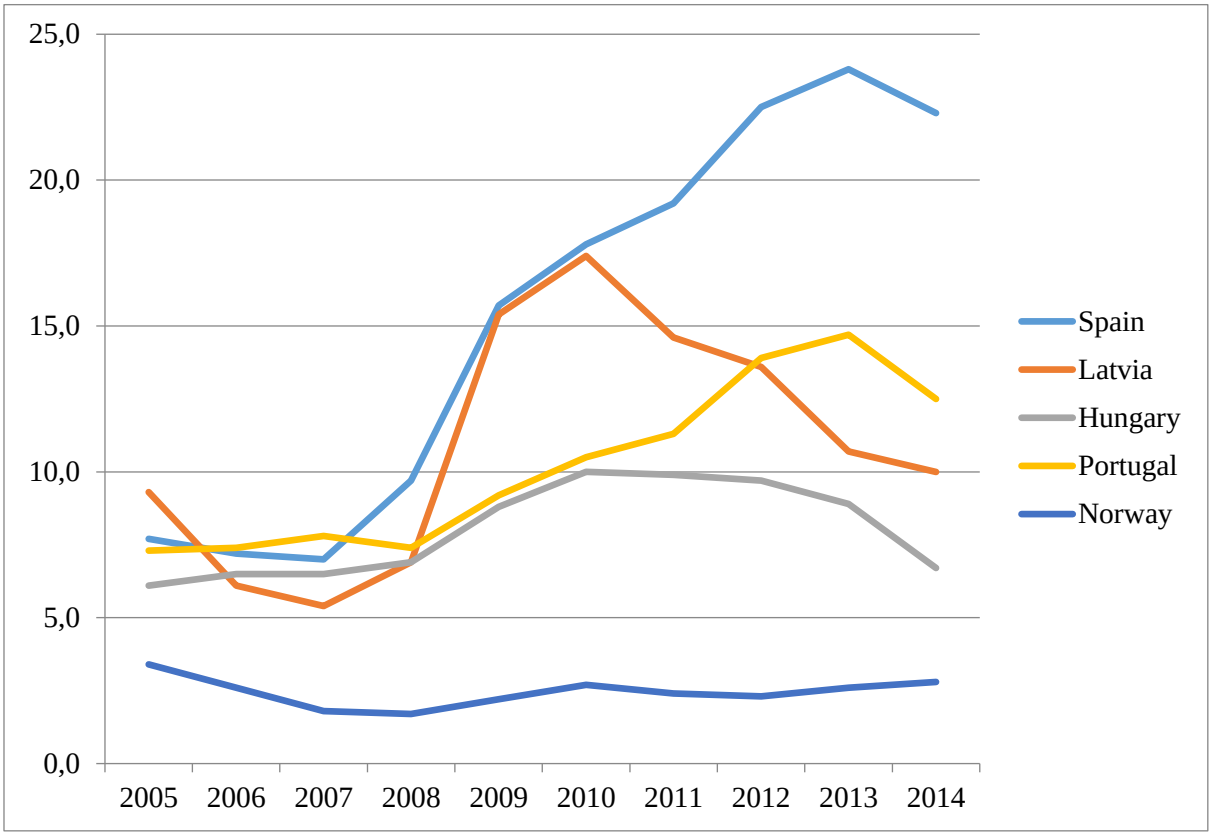
When the unemployment rate is high, on the other hand, it is natural to blame the overall state of the economy, and there is thus less associated stigma with unemployment. Furthermore, since the experience is shared by a large amount of people, unemployment is no longer a major deviance from the social norm (i.e. employment). People are probably concerned about their relative standing, and will compare themselves with a reference group (Merton & Kitt 1950). If the clear majority in the reference group is employed, while he/she is unemployed, the negative health effects could be large. During a crisis, however, a greater part of the reference group will also be unemployed, perhaps implying that it is easier to deal with the experience.

Third and finally, the economic conditions will obviously have an impact on (perceived) *re-employment likelihood*, which could be of importance for health and wellbeing among the unemployed. When demand for labor is low, there will be more applicants for each available job opening, and employers are therefore free to 'pick and choose' to a higher extent (Noelke & Beckfield 2014). Due to the increased competition, it is more difficult for the unemployed to gain re-employment, and unemployment episodes will become longer. This

could lead to more feelings of hopelessness and despair, and hence to more negative health effects. The unemployed will most likely pay attention to the state of the economy, and will thus notice changes in local/regional labor demand. Rise or fall in the unemployment rate is normally reported in the news, and an unemployed person will certainly notice whether there are more or less job openings while searching for a new job. The knowledge that the economic conditions are deteriorating further might cause him/her to become unhappier.

The insecurity related to *re-employment likelihood* during a crisis could in fact 'cancel out' the potential positive effects of the two other processes mentioned above (*compositional changes* and *less stigma/self-blame*). Unfortunately, it is not possible with the present data material to directly observe the three processes, and we have to rely on an indirect test, namely to compare results for countries experiencing differing economic conditions.

Figure 1. Overall national unemployment rate 2005—2014 for Spain, Latvia, Hungary, Portugal and Norway. Source: Eurostat (2016a).



Note that this dissertation distinguishes between *demand for labor*, on the one hand, and *economic conditions* on the other. The former refers to the unemployment level in a given year, while the latter refers to a combination of the level and trend in the unemployment rate. For instance, demand for labor was quite similar in Latvia (13.6 percent) and Portugal (13.9

percent) in the year 2012, but the trend in the unemployment rate differs markedly: the unemployment rate is steadily growing in Portugal, but falling in Latvia in the years 2010—2013 (see figure 1). This could be important for how people experience being unemployed, as the situation can be felt as more hopeless when the economy is still deteriorating (and chances for re-employment seem highly unlikely). In addition, the trend in the unemployment rate (e.g. how rapidly it increases) is very relevant for whether the composition of the unemployment population changes during an economic downturn or not.

Table 2. Overall national unemployment rate: example of country classification.

	2007: Pre-crisis year	2011: Crisis year	2007 → 2011	Average 2010—2013	Trend 2010—2013
Spain	7.0	19.2	Crisis	20.8	Growing
Latvia	5.4	14.6	Crisis	14.1	Falling
Portugal	7.8	11.3	Mild crisis	12.6	Growing
Hungary	6.5	9.9	Mild crisis	9.6	Stable, falling
Norway	1.8	2.4	No crisis	2.5	Stable
Notes	As percentage of active population, age range: 25-74. Source: Eurostat (2016a). Unemployment trends 2005—2014 in figure 1 above. See table 1 in paper 4 and table 1 and 2 in paper 5 for more detailed information.				

Table 2 summarizes some of these nuances for five European countries (Spain, Latvia, Portugal, Hungary, and Norway). Spain (7.0) and Hungary (6.5) had quite similar unemployment rate in 2007, but the impact of the economic downturn was considerably more severe in Spain. The average unemployment rate 2010—2013 (20.8 percent) was almost three times as high as the level in 2007. Moreover, the unemployment rate was gradually growing throughout these years. Hungary, on the other hand, experienced a milder crisis, although there was a noticeable increase here as well (of approximately 3.5 percentage points). The above-mentioned countries of Latvia and Portugal exemplify differing trajectories during the economic crisis (see figure 1). The immediate impact was very strong in Latvia, where the unemployment rate almost tripled from 2007 to 2009. In contrast, Portugal experienced much weaker growth in the unemployment rate in the first years, but the level continued to increase in the 2010—2013 period. In the same years, Latvia witnessed decreasing levels of unemployment, a clear sign of improvement in the economic conditions. Lastly, some

countries – such as Norway – was barely affected by the crisis at all, and the unemployment rate remained at a low level.

Differential demand for labor in Scandinavia and Europe is an important topic for all five empirical papers, but economic conditions are primarily examined in paper 4 and 5. In these two studies, information is used for all available European countries (N=28, 25), in order to have as much variation in unemployment level and trend as possible. Correspondingly, the two last – and interrelated – research questions concerns the *economic conditions* in Europe. We examine how this affects the individual-level relationship between unemployment and health through the following questions:

4. Does the composition of the unemployment population change for the healthier in countries where the overall unemployment rate increases (rapidly) to a high level?
5. Are the negative health effects of unemployment less pronounced in countries in which the unemployment experience is more widely shared?

Before the five overarching research questions can be examined, we have to take a closer look at the data material and analysis techniques used in the empirical papers.

4. Data and method

This chapter starts with a description of the data material (EU-SILC) and key variables (health and unemployment). Afterwards, the analysis techniques are described, with an emphasis on individual level fixed effects models (FE) and propensity score matching (PSM). The chapter is ended by a discussion of causal inference.

4.1 EU-SILC data material

The European Union Statistics on Income and Living Conditions (EU-SILC) is used in all five empirical papers. The aim of EU-SILC is to collect comparable cross-sectional and longitudinal micro-data on a wide range of areas, such as poverty and social exclusion (Eurostat 2016d). The EU-SILC sampling unit varies between dwellings (e.g. Spain), households (e.g. Belgium), and individuals (e.g. the Netherlands) (Eurostat 2016e). Similarly, the mode of data collection varies between paper-assisted personal (e.g. Hungary), computer-assisted personal (e.g. U.K.), computer-assisted telephone (e.g. Switzerland), and self-administered interview (Germany), or a combination (e.g. Latvia). In addition, some information is retrieved from official registers. However, the data material is harmonized for comparative purpose, and is therefore well suited for the present dissertation.

Unfortunately, there is no overall information on unit non-response[18] and attrition available in EU-SILC, but evidence from the Norwegian part indicates that old age and low education is related to both (Wilhelmsen 2012). Hence, it is highly likely that 'vulnerable groups' are somewhat underrepresented in the EU-SILC, which could have an impact on the empirical studies. For instance, people who are hospitalized could be difficult to reach, implying that the samples will be positively selected on health characteristics. People with extremely bad health status are, in most cases, unable to participate in the labor force, and the exclusion of these individuals will therefore probably not bias the results much. Nonetheless, it is important to acknowledge that the EU-SILC samples could be positively selected on characteristics such as educational level, age and health status.

The 2007 and 2011 cross-sections are used in one of the empirical studies, where the health—unemployment relationship is investigated in 28 countries before and during the economic crisis. In the remaining four papers, the EU-SILC panel is utilized. The longitudinal

[18] The unit non-response rate in the EU-SILC 2007 cross sectional data varies from 8 (Cyprus) to 42 (Denmark) percent, but is typically (in 11/20 countries) around 15-20 percent (Verma, Betti & Gagliardi 2010: 27-29). The mean overall for the 20 countries included in the report is 22 percent.

nature of the data is an obvious strength because we are able to follow the same individuals over time. Hence, we can see whether people who lose their jobs deteriorate in health afterwards, or whether people with (emerging) health problems are more likely to become unemployed. It is also possible to specify individual level fixed effects models (FE), which is an advantage from a causal inference point of view (more below). There are, however, two major challenges with the EU-SILC panel data. First, the panel is quite *short* due to the four-year rotary structure, and the maximum number of observations per individual is therefore four. Second, the panel is *unbalanced*, which means that not everyone is followed for all four years. This is due to the rotational panel structure, where a new sample of households/persons is introduced each year to replace roughly a quarter of the existing panel (Verma, Betti & Gagliardi 2010: 15), meaning that people are followed for different lengths (i.e. 2, 3 or 4 years). These two shortcomings imply that there is quite little 'room' for within-individual change over time in the variables of interest.

Since the panel data is both short and unbalanced, it might be better to use repeated cross-sections, where attrition is less of a problem and the number of observations is higher. However, it is not possible to localize – and statistically adjust for – the individuals who contribute with several observations, which probably will cause quite severe bias. Some persons might switch jobs or get fired very often, and hence answer the same several surveys in a row. We would obviously not be able to follow people over time either (e.g. to examine health trajectories and employment histories).

The unemployment—health relationship is influenced by a large number of factors, both on the individual (e.g. educational qualifications), regional (e.g. local labor market demand) and national (e.g. health care system) level. This means that the association between health and employment status almost certainly will vary greatly across (some of) the included European countries. The prevalence of higher educational qualifications is, for instance, much higher in Germany (ca. 35 percent) than in Portugal (ca. 10 percent) according to EU-SILC 2011 cross-sectional data. Another example is the comprehensiveness and generosity of unemployment benefits. If the benefit level is very 'meager' in some European countries, the unemployed are more likely to experience financial hardship (which potentially affect health and wellbeing). Because of this vast cross-national heterogeneity, all of the analyses in the five empirical papers are performed separately for each country.

In paper 4 and 5, all available countries in EU-SILC are included in the analyses, yielding 28 and 25 number of 'country-level' observations, respectively. This opens up the possibility to run *multilevel regression models*. Monte Carlo simulations suggest that 25

countries is required, at the very minimum, in order to retrieve reliable and precise country-level estimates in linear multilevel regression models (Bryan & Jenkins 2016: 19). The number of countries included in paper 4 and 5 is therefore large enough, as long as the estimated model is rather simple (i.e. with few country-level predictors). However, multilevel models are not preferable because (i) paper 4 examines compositional changes within each included country, and (ii) paper 5 uses statistical techniques (FE and PSM) that are difficult to integrate in a multilevel framework. In paper 5, we rather use a two-step procedure, where treatment effects for each country are plotted against the country-level variable of interest (the overall unemployment rate). Hence, we rely on a *graphical representation* of the country-level variance, instead of a more formal statistical hypothesis test (Bowers & Drake 2005). To use this visual technique allows for a richer and more accurate description of the cross-national variation than a simple country-level coefficient derived from a multilevel regression model (which potentially could hide important patterns in the data).

We end this section with a note on *ethical considerations*. The EU-SILC data material are in secondary and anonymized format, ensuring that confidentiality and identification issues are dealt with appropriately. The research project named "Health Inequalities, Economic Crisis and the Welfare State" (HIECWS) applied for access to the EU-SILC microdata, and access were granted after we documented that the data would be stored correctly and securely. The data have been kept on a local (and locked) part of the internal server at the host institution (Oslo and Akershus University College), and only members of the HIECWS research project can enter this part of the server, safeguarding against misusage.

4.2 Key variables

Health and employment status are the most important variables[19] used in this dissertation. Three employment status variables are utilized, namely hiring, employment, and unemployment. Only the latter will be discussed here, since our main interest is in the health—unemployment relationship (see paper 1 for operationalization of hiring and employment). We start, however, with a discussion of health status.

[19] A number of covariates (e.g. educational level, age, marital status, gender) is also included in the analyses, see the empirical papers for operationalization. Quite parsimonious models are preferred throughout in order to avoid the problem of "bad controls" (Angrist & Pischke 2009: 64).

4.2.1 Health status

The World Health Organization (WHO) defines health in the following manner: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Hence, the WHO formulation is not simply a negative definition of health (e.g. lack of health problems), but rather includes a wide range of domains important for the wellbeing of individuals. Huber et al. (2011) finds the WHO definition inadequate, partly because of population aging and recent changes in illness patterns (e.g. higher prevalence of chronic diseases), and the authors propose a formulation of health as "the ability to adapt and to self-manage". Regardless of the specific definition used, health remains a fundamental human right, and is recognized as such in the Universal Declaration of Human Rights from 1948. The importance of health is indisputable, as exemplified by the large number of people stating "my health" when asked what is most important for them (e.g. see figure 1.6 in OECD 2015, and table 2 in Benjamin et al. 2014).

It is commonplace to distinguish between *disease*, *illness* and *sickness* in health research (Hofmann 2002; Twaddle 1994). *Disease* refers to physiological malfunctions resulting in deteriorated health status and/or reduced life expectancy. Disease is therefore an organic and objective phenomenon 'independent' of the subjective experience of the symptoms. *Illness* incorporates the subjective side, and consists of feelings of pain and weakness, and perceptions of overall bodily functioning. Thus, it is possible that a person experience illness to a large extent without it corresponding to a disease as discovered and diagnosed by a physician/ GP. *Sickness* – the third and last concept – is located on the societal level, and asks whether other people recognize the specific health problem as a serious medical condition or not. This could, for instance, give the person a legitimate reason to be economically inactive, as in the 'sick role' identified by Talcott Parsons (1951). The current thesis relies on individual-level and self-reported health data, which are clearly most compatible with the *illness* concept.

There are two available health measures in EU-SILC, both of which utilized in the empirical papers. First, *limiting longstanding illness* (LLSI), computed from two questions: (i) "Suffer from any chronic (longstanding) illness or condition?" and (ii) "Limitations in activities people usually do because of health problems for at least the last six months?" Respondents answering yes on both are coded 1 (else=0). Second, people are asked about their *self-rated general health status* (SRH), with the following answer categories: 'very good', 'good', 'fair', 'bad' and 'very bad'. Two versions of SRH is used: one continuous

(coded 0-4), and one dichotomous differentiating between those with 'very bad', 'bad' and 'fair' health on the one hand, and 'good' and 'very good' on the other hand. Those with 'fair' health are included in the "bad health" category for two reasons. First, due to a very low number of individuals stating health to be bad and very bad in certain countries (e.g. roughly 5 percent in Sweden), problems with low statistical power arise. Second, people reporting fair health status could be disadvantaged on the labor market as well.

The two health measures tend to correlate quite high, as indicated by the EU-SILC cross-section 2011. In this dataset, the correlation between SRH (continuous) and LLSI (dichotomous) is 0.62 for all 31 included countries pooled, varying between 0.49 (Switzerland) and 0.74 (Greece). However, the correlation is far from perfect, indicating that they measure somewhat differing aspects of health. LLSI should capture quite serious illnesses and health impairments of a rather long-term kind, implying that 'mild' and temporary conditions are left out (e.g. brief moments of back/neck-pain). Self-rated health, on the other hand, will mainly reflect respondents' self-perceived fitness and psychosocial wellbeing (Blaxter 2005: 53-54), and more short-lived pains and illnesses could be crucial.

There is, according to Fayers & Sprangers (2002: 187), widespread agreement that the global SRH measure provides a useful summary of health status perception. However, the SRH measure is badly 'framed', for two reasons. First, it does not specify what is meant by 'health', and there is thus ample room for interpretation (e.g. specific health issues, health behavior, level of pain, etc.). Second, the measure is not explicit regarding the reference group. Some will compare themselves with other people of the same age, while others will use themselves in the past for comparison (Fayers & Sprangers 2002: 188). The LLSI measure can therefore be considered as *more precise* than SRH, as the latter is relative in essence. For instance, an old man with quite bad health status could report 'very good' health, because everyone of his own age is in worse shape.

Moreover, the *time aspect* is essential. The LLSI measure is unlikely to change much in the short-term, while SRH could be more prone to change, for instance due to (mental) stress surrounding the unemployment incidence. The SRH measure could in fact be *too* sensitive, and people having a bad day (e.g. due to a fight with a partner/loved one) could rate their health to be poorer than it actually is. The opposite is of course also possible, for instance people stating that their health is better because they are in a very good mood. However, this will not create systematic error in the survey data as long as these events occur randomly throughout the data collection process. Another important aspect is related to how easy/difficult it is for an employer to observe the health status of the (potential) employee (see

section 2.3.2). A limiting longstanding illness is, compared with bad/fair health, probably more *easily observable* for the employer, and the associations between health and hiring/firing probabilities should hence be most pronounced for the LLSI measure (given that health status plays a part in these processes).

There is also a distinction between the two measures from a comparative point of view: The *cross-national differences* are considerably larger for SRH than for LLSI. For instance, the prevalence of bad/fair health ranges from 17.91 (Switzerland) to 62.34 (Lithuania), while the corresponding range is 11.52—33.70 (Luxembourg and Estonia, respectively) for LLSI in the 2011 EU-SILC cross-section. Hence, when the aim is to compare results between countries, the LLSI measure could be considered as a more appropriate choice. Lastly, it would obviously be desirable to have access to more objective health information, but the reliability of self-reported health measures seems to be satisfactory (Ferraro & Farmer 1999; Martikainen et al. 1999), and SRH is an independent predictor of mortality (Idler & Benyamini 1997; Kaplan & Camacho 1983). The EU-SILC is currently the best choice if one is interested in the health—employment status relationship from a cross-national comparative perspective. Thus, we have to make do with the subjective nature of the health information.

4.2.2 Unemployment

The International Labour Organization (ILO) define[20] *unemployment* as "all persons above the specified age (for each nation) who during the referenced period were not in paid employment or self-employment, were available for paid- or self-employment and had taken specific steps to seek paid- or self-employment". Currently not holding a job is therefore insufficient in order to be counted as unemployed according to the ILO, you also have to do something in order to *change* your economic status. A shortcoming of the ILO definition 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 & Ferrie 2001). The problem with 'discouraged workers' could in fact be a pressing issue given the recent economic downturn in Europe with few available job openings (and low re-employment likelihood). This is probably less of a challenge, however, in countries where ALMP is widespread (e.g.

[20] The Bureau of Labor Statistics use a similar definition for the US labor market: people who do not have a job, have actively looked for work in the past four weeks, and are currently available for work.

Scandinavia), because actively searching (and applying) for jobs is a requirement in order to receive unemployment benefits.

Unemployment is normally an *involuntary* experience, consisting of losing the previously held job, and/or having difficulties in (re-)gaining employment. Obviously, some people could prefer being unemployed for a (short) while waiting for 'the right' job offer to appear. Unemployment of a more prolonged kind, however, is seldom chosen freely, in part because of the associated income drop (see section 2.3.3). The fact that unemployment is undesirable does, of course, not imply that all individuals love to work and are passionate about their occupation. It is, however, very difficult to 'make ends meet' without holding wage labor (or being self-employed) in a market economy, and to remain unemployed is therefore not a viable option for most people. In addition, living of unemployment benefits is not compatible with providing for a household since the income level is often quite low, and there are time limits to these benefits as well. Hence, there are probably quite few individuals who actively choose to be unemployed if he/she has other options in the market.

Two different unemployment measures are utilized in the empirical investigations (paper 2—5). First, a measure that is quite in line with the above-stated ILO definition, derived from answers to 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 (else=0). This measure differs from the ILO definition because individuals coded 1 could, in principle, hold employment (although it is quite few jobs with less than two weeks' notice period). The second unemployment measure is based on a question regarding respondent's self-defined current economic status, and those who report being unemployed are coded 1. The correlation between the two unemployment measures are 0.74 overall in the EU-SILC cross-section 2011, varying from 0.45 (the Netherlands) to 0.87 (Slovakia). The correlation is therefore quite strong (Cohen 1988), and below 0.6 in merely four (the Netherlands, Norway, Malta and Switzerland) out of 31 countries.

An important issue is the extent to which people are *misclassified* while using the two above-mentioned unemployment measures. Some people could, for example, state 'unemployed' as *current* economic status, but hold an employment contract that starts two weeks ahead. The opposite is of course equally possible, i.e. stating to be employed during the interview, but suddenly loose the job a short while after. Furthermore, unemployed individuals might lie about it, and report being 'employed' because they feel ashamed. Similar concerns apply for the health measures as well. Some people might exaggerate their health problems in an effort to rationalize the fact that they are currently out of work, for instance.

Measurement errors such as these are difficult to account for in survey data, and it might bias the results to a considerable extent. It is, however, no reason to expect vast cross-national differences in misclassification, which is reassuring since our prime interest lies in the comparative perspective.

Table 3. Summary of EU-SILC data materials, outcome measures, explanatory variables and analysis techniques used in the five empirical papers

Paper	Panel?	Cross-section?	Years	Outcome	Explanatory variable	Analysis technique
1	Yes		2008—2011	Employment	Bad/fair health	GLS
2	Yes		2007—2010	Unemployment	LLSI	GLS, FE
3	Yes		2007—2010	LLSI	Unemployment	FE
4		Yes	2007, 2011	Unemployment	LLSI	OLS
5	Yes		2010—2013	SRH	Unemployment	FE, PSM

Abbreviations: Limiting longstanding illness (LLSI), Self-rated health (SRH), Generalized least squares (GLS), Individual level fixed effects (FE), Ordinary least squares (OLS), Propensity score matching (PSM).

Different main independent and dependent variables are used throughout the empirical studies (see table 3), and the reasons underlying these choices are spelled out more carefully in the papers. Note that the (in)dependent variable(s) are changed as a sensitivity test in most cases, which makes it less likely that the results are driven by the choice (and operationalization) of the key variables.

4.3 Methods

Different kinds of statistical methods are used in this dissertation, ranging from simple t-tests of differences in means, to more advanced statistical modeling, such as individual level fixed effects models (FE) and propensity score matching methods (PMS). In the following, we devote some attention to the regression techniques, with an emphasis on panel data and FE models. Afterwards, attention is turned to PSM, and the section is ended with a short discussion of causal inference.

4.3.1 Regression techniques

A regression analysis tells us how the dependent variable changes with varying values of the independent variable (while holding the included covariates fixed). In other words, whether

the independent variable is able to predict – in a purely statistical sense – variation in the outcome measure. Typically, we are interested in whether differences between groups of people (e.g. employed and unemployed) can account for differences in some outcome (e.g. health). Note that we are working with *averages* here, and a lot of individual variation is therefore 'sacrificed' in order to arrive at an efficient statistical summary of the association. It is also important to stress the difference between the *population* of interest, and the specific *sample* used. The 'ultimate goal' is to make statements about the population (e.g. people with health problems), but we are most often only able to use an approximation (e.g. people with health problems who answered the questionnaire).

While running a normal linear regression (OLS), the best fitting line between the two variables of interest is generated by minimizing the squared errors (Angrist & Pischke 2009: 34). The outcome measure is dichotomous in four out of five empirical studies in this thesis, and non-linear models, such as logistic regression, could therefore be considered as a better choice. It is, however, challenging to compare results across different groups and samples in logistic regression (Mood 2010; Allison 1999). This challenge arises because the size of the coefficients is affected by the degree of unobserved heterogeneity in the model specification (due to the fixed variance of 3.29 in the logistic distribution). Since the results of all empirical papers are compared cross-nationally, linear models are preferred throughout. Linear and logistic models yield very similar outcomes in significance testing, so the violation of the homoscedasticity assumption seems to have little practical importance (Hellevik 2009). Furthermore, results derived from linear models have the additional advantage of being easier to interpret (i.e. differences in probabilities).

Cross-sectional data is used in paper 4, and ordinary least squares regressions (OLS) are performed (with logistic regression as a sensitivity test). Panel data is utilized in the remaining papers, and OLS models are not preferable because the standard errors will be biased when estimated on repeated measurement data. Generalized least squares regression (GLS), on the other hand, corrects for the fact that we follow people over time (Allison 1994), and are therefore a better choice. It should be noted, however, that OLS with standard errors clustered on individuals most often yield almost identical results as GLS models (e.g. see table A3 in paper 1). Calendar year dummy variables are included in most regression models in order to control for differential demand for labor and other important time-trends relevant for the health—employment status relationship.

One of the main perks with panel data is the possibility to run individual level fixed effects models (FE). The attractiveness of FE is related to the fact that the all *time-invariant*

personal characteristics are automatically controlled for (Gangl 2010; Halaby 2004). In other words, every conceivable individual characteristic that do not change over time (e.g. being charming or quick-witted) will not bias the results, and we can be much more certain that the statistical association is not a spurious one. In fact, FE might even lead us towards establishing a causal relationship (more in section 4.3.3). The basic idea in FE models is to estimate the impact of a *change* in the independent variable on a (subsequent) *change* in the dependent variable, for instance whether a person who develops a health problem loses his/her job afterwards.

FE models 'eliminate' the threat from personal characteristics that do not change over time, but are these variables more important than change-prone variables? The answer obviously depends on the specific research question asked, but there is no doubt that time-invariant characteristics covers a lot of ground. Childhood living condition is one example. The hometown one grew up in, possible household poverty experienced, and number of friends and siblings are all potentially vital for future life outcomes, and these characteristics do not change (for adults). Similarly, biological factors are probably not prone to change[21] much over time either. Thus, if childhood conditions and/or genetic endowments are believed to be of major importance for the statistical association in question, then FE models could be a good choice. Another issue is what the vector of time-invariant characteristics actually corresponds to. Is it a specific set of unobserved covariates, or something more 'vague' that varies from person to person? In labor market analyses, the vector will probably absorb factors that usually are difficult to control for, such as 'looking good and sounding right' (Williams & Connell 2010). Within health research, the vector will, for instance, capture health-relevant personality traits (e.g. conscientiousness and neuroticism, see Goodwin & Friedman 2006) and genetic factors.

The *temporal order*/ time structure is essential in FE models. If an employed person reports good health in 2007, and then reports both health deterioration and unemployment in 2009, we do not know whether the person has lost the job because of the health decline, or whether health status deteriorated because of the unemployment experience. This problem can potentially be fixed with a lagged independent variable, and/or by restricting the outcome measure to the last years observed in the data. Recall that the EU-SILC panel data is both

[21] Proponents of *epigenetics* will disagree with this statement, and highlight that environmental factors can 'switch' (the expression of) genes on or off. Genes in themselves change little, but they always act in interaction with environments. It is also important to stress that biological factors are more than genetic endowments, and a lot of biological factors *do* change over time (e.g. weight, eyesight, muscular capacity, etc.).

short and unbalanced, which leaves little room for within-individual change over time. Thus, it is not possible to run the most 'rigorous' kind of FE models, and some uncertainty will remain as to the causal direction of the relationship. Perhaps propensity score matching techniques is a solution to this problem?

4.3.2 Propensity score matching

In paper 5, propensity score matching methods (PSM) is utilized in order to examine whether being or becoming unemployed (the 'treatment') harms self-rated health in the short-term. Matching is a strategic subsampling of the data material, where the researcher selects one (or several) non-treated control case(s) for each treated case based on observable characteristics (Morgan & Winship 2007: 89). The propensity score is defined as the *probability of treatment assignment*, conditional on observed baseline covariates (Rosenbaum & Rubin 1983). Matching is appealing because of its simplicity: a covariate-specific comparison between treatments and controls, weighted in order to produce an overall treatment effect (Angrist & Pischke 2009: 69). However, the perhaps most appealing feature of PSM is that it 'forces' researchers to focus on the selection to treatment (i.e. unemployment) (Angrist & Pischke 2009: 84), instead of the more complex processes that determines the outcome (health status, in our case). In addition, PSM is a non-parametric method, and does therefore not impose any functional form assumptions (e.g. linearity) (Morgan & Harding 2006: 51).

The main idea in PSM is to construct 'statistical twins' who are similar on observable characteristics, but differ on exposure to treatment (i.e. one unemployed, the other employed). If the selection of 'twins' is done properly, one should – in principle – be able to arrive at the (potential) negative effect of unemployment on health by a simple comparison of mean values in SRH between the 'treated' and 'control' subjects. Before this comparison is done, however, one needs to estimate the propensity score, which is used to balance the data. Data materials are, most often, limited in sample size and it is thus difficult to find treatment and control subjects identical on *all* characteristics (e.g. one unemployed and one employed married man of 52 ½ years, with 3 children, higher education, earning 60 000 € last year, living in the same town, etc.). The solution to this challenge is to stratify on the propensity score (χ) itself, instead of more detailed on all the variables included in χ (Morgan & Harding 2006: 22). That is, we reduce the multidimensional space in which people vary to a *one-dimensional space*, namely the propensity score (varying from 0-1).

A logit model with polynomial terms for continuous variables is commonly used when estimating propensity scores (Angrist & Pischke 2009: 83). As the goal is to calculate the probability of *treatment assignment*, it seems sensible to include covariates known to be associated with unemployment probability (Austin 2011a). In other words, the only (observable) variables that are relevant to include are the ones which are known to be associated with being or becoming unemployed.

In summary, matching methods make use of observable covariates important for the statistical relationship in question, and try to find 'statistical twins' consisting of treated and control subjects. This sounds rather similar to a normal regression procedure, and most matching estimators can in fact be rewritten as non-parametric regressions (Morgan & Harding 2006: 46). So, what is the major difference between PSM and a 'naïve' OLS using the same set of covariates? The difference[22] is mainly related to which observations that 'count the most' in the analysis (Angrist & Pischke 2009: 73-76). PSM puts the most weight on the (control) observations that are most likely to be treated, according to the included covariates. OLS, on the other hand, tries to minimize the squared errors and therefore puts more weight on (control) observations that are quite dissimilar to the treated subjects. This implies that the results could differ quite a lot between OLS and PSM, even though the exact same covariates have been used in the estimation.

This section is ended with a few practical notes. Different algorithms exist for choosing matches and for weighting the matches in the comparison procedure (Morgan & Harding 2006: 31-33). Kernel matching is reported in paper 5, but all analyses have been performed with nearest neighbor caliper matching (with replacement) as well. In *kernel* matching, all control respondents are used as matches, but each control subject is weighted according to how close his/her propensity score is to the treated individual. The bandwidth (set to 0.02 in our case[23]) determines how differences in propensity scores are translated into weights (Guo & Fraser 2015: 290-291). Higher bandwidth values lead to a smoother estimated density function, and thereby a better fit to the data, but this could come at the expense of increased bias. We chose a rather low bandwidth in order to keep bias at the minimum, but the results were similar with higher bandwidth values (0.06, 0.10).

[22] In addition, it is also possible to estimate both the average treatment effect for the treated (ATET) and the average treatment effect for the untreated (ATEU) in PSM.
[23] A bandwidth of 0.02 ensures that the normalized difference between treatment and control subjects is smaller than 5 percent for all variables.

In *nearest neighbor caliper* matching, the treated individual is matched to the four[24] control subjects with closest propensity score. A caliper of 0.01 was set in order to restrict the availability of matches, since some of the untreated individuals could be very different from the treated. A caliper of 0.01 corresponds roughly to a width equal to 0.2 of the standard deviation of the estimated propensity score logit, which has resulted in optimal estimation in several settings (Austin 2011b). The analyses are performed with bootstrapped standard errors (100 replications) throughout. Bootstrapping[25] is used to estimate standard errors when they are difficult to compute analytically and/or when the theoretical distribution of the statistic is unknown.

Lastly, two different outcome measures are used in the empirical investigation: both (i) the level of, and (ii) changes in self-rated health (SRH). The change in SRH is constructed by subtracting the last available SRH observation from the first SRH measurement, and this change score gives us a *difference-in-difference* estimate (Guo & Fraser 2015: 287-288, 298). This procedure is an advantage from a causal inference perspective, because it allows us to compare trends in self-rated health between treated and control individuals, and all time-invariant personal characteristics[26] are thereby accounted for (Morgan & Harding 2006: 44). Clearly, this strategy has the same challenges as the FE models, because of the short and unbalanced EU-SILC panel (leaving little room for within-individual changes over time). There is thus some uncertainty concerning whether the results can be interpreted in a causal manner or not, which is the topic of the next section.

4.3.3 Causal inference

Correlation is obviously not the same as causation, but Pearl (2009: 30) reminds us that "all correlation has its origin from causality". So the establishment of a statistical association provides us with an opportunity to discover a potential causal relationship. The most common framework for the understanding of how one can identify a causal effect is the *counterfactual* one[27] (Finseraas & Kotsadam 2013; Morgan & Winship 2007: 4-6), which also applies for the current dissertation. This perspective implies that we are interested in knowing what would

[24] The results are not sensitive to the choice of four instead of one or two control subjects.
[25] Abadie & Imbens (2008: 1546-1547) argue that bootstrap standard errors are not valid in *nearest neighbor* matching with replacement because 'treated' subjects are matched to the same 'controls' in every replication. This is, however, not a problem for *kernel* matching.
[26] This is equivalent to adding individual level fixed effects in a regression model.
[27] See Flanders (2006) for a discussion of the relationship between the counterfactual/ potential outcome model, on the one hand, and the sufficient-component cause model on the other hand.

have happened with the outcome variable if a certain 'treatment' had not taken place (i.e. X is a cause of Y if and only if Y would not have happened if X had not happened). This does not mean, however, that only experimental evidence is sufficient for scientific purposes, something Angrist & Pischke (2009: 113) states clearly: "… correlation can sometimes provide pretty good evidence of a causal relation, even when the variable of interest has not been manipulated by a researcher or experimenter".

Two causal questions are addressed in this dissertation: (i) whether people who deteriorate in health lose their jobs because of it (paper 2), and whether unemployment causes health to deteriorate (paper 3 and 5). The latter question serves as an example in the following. It is impossible to examine how the health status of an unemployed individual would have been if *the same* individual remained employed instead, which is commonly referred to as the fundamental problem of causal inference (Holland 1986). In practice, we have to create some kind of control group, for instance consisting either of carefully matched employed individuals (as in PSM), or of the same individual before he/she became unemployed (as in FE). Furthermore, the 'endogeneity problem' is a pressing issue. The unemployed are most likely a selected group on both observable (e.g. educational level, health status) and unobservable (e.g. conscientiousness, cognitive abilities) characteristics, and it is important to account for this selection if one is interested in the 'true' causal effect of unemployment on health.

These challenges are dealt with through different types of statistical modeling techniques (GLS, FE and PSM) in this dissertation. Results from the GLS analyses can only be interpreted causally if the so-called *random effects* assumption is fulfilled: i.e. the unobserved differences between individuals are uncorrelated with both the independent variable(s) and the error term (Allison 1994). Clearly, this is a rather strict assumption, which is unlikely to hold while using survey data, and the GLS (and OLS) models are only able to provide us with descriptions of the statistical associations in question. This does not mean, however, that this type of descriptive analyses are useless, quite the contrary. Results from GLS and OLS models will, in many cases, provide important information, but the reported correlations cannot, without hesitation, be taken as evidence of causality (within a counterfactual framework).

The FE models, on the other hand, are better suited for causal statements, since all time-invariant personal characteristics are accounted for. This means that a whole range of potentially important biasing factors – both observed and unobserved – is no longer a problem. Still, individual characteristics that *are* prone to change might be the essential causal

factor in the relationship of interest. For instance, people developing a health problem could simultaneously become less confident, and this 'personality change' could be the real reason why he/she lost her job (and not health decline, per se). Furthermore, even if the personal characteristic does not change over time, it is possible that *the effect* of the characteristic does. Holding higher educational qualifications is normally related to lower unemployment likelihood, but this could change during an economic downturn because the high-skill jobs are outsourced and/or because high-skill employees have higher wages. Hence, we have to be cautious while interpreting the FE results, especially given the unbalanced and short panel data at our disposal.

The short and unbalanced panel data is less of a problem for the results derived from PSM. If the subsampling of the data using the propensity score completely accounts for all systematic differences between treatment and control subjects, then conditioning on this score will yield a consistent estimate of the treatment effect (Morgan & Harding 2006: 17). Yet, some cautionary comments are necessary here as well. Even though the balancing procedure[28] seems to have been successful, there could be unobserved individual characteristics (e.g. cognitive abilities or certain personality characteristics) omitted from the propensity score that are important for both the outcome and for treatment assignment (Rosenbaum & Rubin 1984). Selection on unobservable characteristics is therefore still an issue, and matching methods cannot compensate for data insufficiency, for instance lack of appropriate variables and/or measurement error. However, as long as the (potentially important) omitted variables are strongly correlated with the included variables, the PSM procedure should provide us with fairly unbiased and consistent treatment effects.

[28] We rely on two-sample t-test of equality in means. Standardized bias is an alternative procedure, which compares the distance between the marginal distributions (i.e. the difference in sample means between treated and control subjects as a percentage of the square root of the sample variance in both groups for covariate X). We prefer the t-test because it is easier to grasp.

5. Empirical results – summary of five papers

Paper 1. Hiring, employment, and health in Scandinavia: The Danish 'flexicurity' model in comparative perspective

European Societies (2016), 18(5): 460-486.

Previous research has established beyond any reasonable doubt that people with ill health are less likely to become and remain employed. Furthermore, the labor market disadvantages experienced by people with health problems could be amplified during an economic downturn, because there are more applicants for each available job opening. Thus, employers will be more able to 'pick and choose', and applicants possessing an 'uncertainty signal', such as bad health status, will probably have a lower hiring likelihood. An intriguing question in this context is whether certain institutional settings are able to 'level out the playing field' for individuals with ill health. It has been suggested that weak employment protection is favorable for 'vulnerable groups' on the labor market, because the risks are lowered within such an institutional framework. If the person turns out to be a bad match for the job and/or unproductive, the employer can simply fire him or her, without worrying about any major costs (e.g. severance pay or long notice period) related to this decision.

The results show that people with ill health are, in fact, more likely to be hired in Denmark – where the employment protection is weak – than in Norway and Sweden. However, this pattern is only evident among higher educated people with ill health, which is surprising given the fact that it is mostly among typically 'low-skill' workers that employment protection is weak in the Danish 'flexicurity' model. In addition, the use of temporary work contracts is highly stratified according to health status in Denmark: people with ill health are twice as likely to have temporary work, compared to people with good health. There is a health component in the use of temporary work in Sweden as well (but to a lesser extent than in Denmark), while the prevalence of temporary work is similar for people with good and bad health in Norway. It is also important to note that the employment rates for people with ill health were similar in Denmark and Sweden in 2011, although Sweden experienced worse economic conditions in the preceding years. Overall, people with health problems are apparently not very disadvantaged in hiring likelihood in neither Norway nor Sweden, perhaps indicating that strong employment protection is not harmful for 'vulnerable groups' after all. On the contrary, the combination of strong employment protection and low

prevalence of temporary work contracts (as in Norway) seems to be the most beneficial 'model' for people with health impairments.

Paper 2. Unemployment in Scandinavia during an economic crisis: Cross-national differences in health selection

Social Science & Medicine (2015), 130: 115-124.

The unemployed tend to be in worse health than the employed, and there are two major explanations for this correlation in the existing literature. Firstly, that people deteriorate in health because of the stress surrounding the unemployment experience (social causation), and secondly, that people with ill health have a higher probability of becoming – and staying – unemployed (health selection). The latter explanation is examined in paper 2, with an emphasis on cross-national differences in health selection. Denmark, Norway and Sweden are similar in many respects, but deviate on two important characteristics relevant for health-related mobility patterns on the labor market. Firstly, the trend in the unemployment rate in the years 2007—2010 have differed. There is a continuingly low rate in Norway, a continuingly high one in Sweden, and a rapidly increasing rate in Denmark. Secondly, the employment protection is considerably weaker in Denmark, and employers could therefore be more inclined to fire employees with (evolving) health problems.

The results indicate that ill health is associated quite strongly with unemployment likelihood, but only in Denmark. There are even signs of this being a causal relationship in the Danish context, where people who deteriorate in health tend to lose their job afterwards (according to individual level fixed effects models). Health selection to unemployment is not apparent as a general phenomenon in Norway and Sweden, but there is some evidence that younger individuals (<30 years) have a high unemployment probability if health status is poor in both countries. These cross-national differences in results could be explained by differential labor demand during and preceding the investigated time window. Pre-2008, people with ill health probably entered the labor market to a high extent in Denmark, but they lost their jobs during early parts of the economic downturn (e.g. due to less seniority). The economic conditions have been considerably worse in Sweden, perhaps implying that people with ill health are underrepresented among the employed in the first place ('suppressing' the level of health selection to unemployment). Lastly, in Norway there are quite simply too few redundancies for there to exist any systematic selection on health characteristics. However, differential labor demand cannot explain why people who deteriorate in health tend to lose

their jobs in Denmark. In conclusion, it seems as though employers utilize the weak employment protection in the Danish 'flexicurity' model, in the sense that they 'get rid of' employees who develop health problems.

Paper 3. Health effects of unemployment in Denmark, Norway and Sweden 2007-2010: Differing economic conditions, differing results?
International Journal of Health Services (2016), 46 (3): 406-429.

The other main explanation for why health status tends to be poor among the unemployed is investigated in paper 3: are there negative health effects of unemployment? Research context is again set to Scandinavia, where the generosity level of unemployment benefits differs quite markedly, with Sweden being less generous than Denmark and especially Norway. In fact, the replacement rate in Sweden is below the average level in OECD, and it could therefore be hypothesized that the (recently) unemployed in Sweden will experience financial hardship to a higher extent than their unemployed counterparts in Denmark and Norway. If this reasoning is valid, then the negative health effects of unemployment should be more noticeable among unemployed Swedes. However, the results indicate that it is only among the unemployed in Denmark that health status tends to deteriorate. This does not mean that unemployment benefits are unimportant for how well the unemployed deal with the situation. On the contrary, the reason for unemployed Swedes doing comparatively well is probably related to the larger role played by unions in the Swedish institutional setting (i.e. the unions act as a 'buffer' against large income drops). Hence, the differences in generosity level between the Scandinavian countries are probably not as large as indicated by OECD. Why the unemployed in Denmark deteriorate markedly in health is somewhat of a puzzle, but could be linked to (i) health-related mobility patterns on the labor market, (ii) low re-employment likelihood given the large and sudden rise in the unemployment rate, and/or (iii) psychological stress imposed by the extensive use of active labor market policies.

The findings are quite positive overall for the three Scandinavian countries, with few signs of health deterioration due to unemployment episodes. This could indicate that the welfare state has succeeded, i.e. the unemployed are taken reasonably good care of, and few individuals have experienced financial hardship and accompanying worries (with potential health damaging effects). Note, however, that only the short-term health effects have been examined, and prolonged unemployment could still represent a substantial health hazard. There is also some uncertainty as to whether the statistical analysis technique (individual level

fixed effects) is optimal, since the panel data utilized is both short and unbalanced. Nonetheless, there is not much evidence of a negative health impact of unemployment in Scandinavia, with the exception of Denmark (and especially 30-59 year old Danish women).

Paper 4. Unemployment and health selection in diverging economic conditions: Compositional changes? Evidence from 28 European countries

International Journal for Equity in Health (2015), 14: 121.

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The statistical association between health and unemployment is most likely sensitive to the overall economic conditions in a country. As the unemployment rate grows, the composition of the unemployment population will probably change, as more individuals with high education and ample work experience (and other 'positive' characteristics) become unemployed too. The health composition of the unemployment population will possibly change as well, and the overall health—unemployment association could thus become weaker. Using cross-sectional data for 28 European countries from 2007 (pre-crisis year) and 2011 (crisis year), paper number 4 investigates possible compositional changes in the unemployment population. The included countries are classified according to two dimensions: (i) the overall level of, and (ii) the increase in the unemployment rate. Countries where the unemployment rate doubled from pre-crisis to crisis year, and where the level is above 10 percent, are classified as experiencing a 'crisis' (Estonia, Greece, Ireland, Latvia, Lithuania, and Spain). The remaining countries are labeled as 'mild crisis' (e.g. Denmark), 'small increase' (e.g. Sweden), or 'no crisis' (e.g. Norway).

The results indicate that the composition of the unemployment population did in fact change for the healthier, but only in countries experiencing a severe economic crisis. In other words, people reporting good health have experienced unemployment to a higher extent than those with ill health in the 'crisis countries'. However, in the remaining countries, people with bad health are – if anything – overrepresented among the recently unemployed. This suggests that people with health problems tend to be among the first to lose their jobs when the economy takes a turn for the worse, but this pattern changes in countries where unemployment becomes a mass phenomenon. The reason why is purely numerical: it is more common to have good health than bad health. Hence, when an entire factory or plant is closed, for instance, there will inevitably be more people with good health status who lose their job.

This explains why the unemployed becomes 'healthier' on average in high-unemployment countries.

Paper 5. "The more, the merrier"? Effects of unemployment on self-rated health in 25 European countries with diverging macroeconomic conditions

Re-submitted, *European Sociological Review*.

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Previous research indicates that being unemployed can be a health hazard, but is it easier to cope with unemployment when there is much of it around? There could be less stigma and self-blame because the unemployment is viewed as more of a structural problem, and less of a personal failing. In addition, the composition of the unemployed population is likely to change when unemployment becomes commonplace, as more highly skilled (and healthy) individuals lose their jobs as well. However, it is also possible that being unemployed is worse in high-unemployment countries, because the low re-employment likelihood strengthens the feeling of hopelessness. Through the use of panel data for 25 European countries (2010-2013), and a range of analysis techniques (OLS regression, individual level fixed effects, and propensity score matching), paper number 5 examines whether unemployment hurts less for self-rated health when the experience is widely shared.

The results show that the unemployed are in worse health than the employed in all investigated European countries, after statistical adjustment for the 'usual suspects' (OLS). This negative association is reduced considerably, but remains significant in most countries even while taking time-invariant personal characteristics into account (FE). The propensity score matching results also indicate that unemployment is associated with health decline throughout Europe. There is no general tendency for less health effects, the higher the national unemployment rate, and 'the more, the merrier' hypothesis is therefore rejected. Furthermore, there is no evidence for more health decline in countries where the economic conditions are deteriorating further (vs. improving), and the re-employment likelihood explanation receives scant support. It is mostly the low-unemployment countries that 'stand out' empirically, suggesting that the composition of the unemployment population probably is of major importance for the unemployed—employed health difference. In conclusion, unemployment seems to be harmful for health regardless of how common the experience is.

6. Discussion

The answers to the five overarching research questions are as follows:

1. The hiring- and employment- prospects are *not* better for people with health problems in Denmark, where the employment protection legislation is weaker.
2. People with ill health *do* have a higher unemployment likelihood in Denmark, compared to Norway and Sweden.
3. The negative health effects of unemployment are *not* more pronounced in Sweden, where the unemployment benefits are less generous than in Denmark and Norway.
4. The composition of the unemployment population *does* change for the healthier in countries where the overall unemployment rate increases (rapidly) to a high level.
5. The negative health effects of unemployment are *not* less pronounced in countries in which the unemployment experience is more widely shared.

Before these findings are discussion in greater detail, we have to ask ourselves whether the results are *reliable* and *valid*.

6.1 Reliability and validity

In a nutshell, *reliability* is that other researchers using the same tools should arrive at similar results as the ones reached in the present dissertation. A large number of sensitivity tests have been performed in the empirical papers, ensuring that choice and operationalization of key variables is not the sole driver of the results. Moreover, most of the statistical analyses utilized are quite 'simple' and easy to grasp, and this increases the *transparency* of the performed research. In other words, it should be rather straightforward for readers to comprehend how the data material has been analyzed, which will make (potential) *replication* simpler as well. The EU-SILC is available for everyone (conditional on fulfillment of data storage issues), which is also an advantage from a replication point of view.

The concept of *validity*, on the other hand, is a bit more complicated. The validity of the research is threatened if the conclusions reached are not *trustworthy*. It is common to distinguish between *internal* and *external* validity. The former refers to whether we can trust the reported results or not, while the latter refers to whether we can generalize the results to other samples/populations or settings (e.g. other time periods). *External validity* is notoriously tricky within the social sciences, as both people and institutions are prone to change. Hence,

the finding that people with ill health seem to be disadvantaged in the Danish 'flexicurity' model does not necessarily mean that weak EPL is harmful for *all* people possessing an 'uncertainty signal'. Similarly, the flexible hiring and firing regulations could perhaps be good for people with ill health in other national contexts, for instance in the U.S. labor market. Finally, the results reported in this dissertation are obviously influenced by the ongoing economic crisis in Europe, and both health-related social mobility patterns and (negative) health effects of unemployment could operate differently in a more booming economic climate.

There are a number of potential pitfalls related to *internal validity*, and we comment briefly on the most important ones (see chapter 4 for more in-depth discussions). It is highly likely that the samples in EU-SILC are somewhat *'positively selected'* on health characteristics, and the presented results are therefore probably not generalizable to individuals with the worst health status. We do not know how this will bias the results, but it is likely that labor market attachment for people with ill health seems better than it is in the complete 'ill health population'. Similarly, individuals most likely to deteriorate in health due to stress following unemployment could be underrepresented, relevant for paper 3 and 5. Perhaps even more worrying is the possibility of cross-national differences in how well 'vulnerable groups' are covered by EU-SILC. However, inspection of descriptive statistics for people reporting bad/fair health revealed quite similar patterns between the Scandinavian countries (paper 1, table A2), which is comforting.

Another important limitation is that we do not *directly observe* the hiring and firing decisions, as in a field experiment. This means that what appear as health selection to unemployment could in fact be related to productivity traits that we are unable to observe (e.g. less firm-specific human capital, lack of certificates, lower motivation, etc.). We are not able to observe the motives underlying the particular choices made by the employer either. There are some potential *measurement problems* as well. The health information is self-reported (and imprecise) and perhaps prone to response bias (e.g. exaggerate health problems in order to rationalize current unemployment). This is only a major problem for our purpose, however, if there are large cross-national differences in such bias. The analyses have not been able to differentiate between long- and short-term unemployment either, and the 'health component' could be more evident for unemployment of a more prolonged kind.

Another potential drawback is the lack of *genotype data* in EU-SILC. Genetic factors are most likely important for people's health resources, and genes could also (indirectly) have an impact on how well people fare on the labor market. A working paper on the effects of job

loss on BMI investigates gene—environment interaction effects (Schmitz & Conley 2016). With American panel data and difference-in-difference propensity score kernel matching, the authors find that genetically[29] at-risk older workers who were not overweight before job loss (due to business closures) were more likely to gain weight than continuously employed comparable individuals were. The results are rather inconsistent, however, and only significant in certain subsamples (e.g. males, white collar workers, college educated). Nevertheless, the study highlights that gene—environment interactions could play a part in the link between employment status and health.

We are mostly estimating average effects, which could hide considerable *treatment heterogeneity* according to several personal characteristics. For instance, a new study using quantile regressions and German panel data finds that job loss due to plant closures primarily hurt health for people on the lower end of the health distribution (Schiele & Schmitz 2016). In other words, becoming unemployed does not deteriorate physical and mental health for people who are in good health prior to job loss, only the ones with bad health are affected negatively. Similar patterns could be evident in the EU-SILC data as well. However, since all research questions in this dissertation requires inspection of cross-national differences, more detailed investigation of effect heterogeneity would probably not help us much.

Lastly, the short and unbalanced data material – leaving little room for within-individual change over time – implies challenges from a *causal inference* perspective in the individual level fixed effects models (paper 2, 3 and 5). Likewise, there could be variables omitted from the propensity score that are of major importance for selection to unemployment and/or for self-rated health, and it is hence uncertain whether the results in paper 5 are of a causal nature. Neither FE nor PSM is infallible when the aim is to examine causal relationship, and especially so while using survey data. However, both techniques ensure that the statistical association is not merely a spurious one. Thus, we are more certain that health and unemployment are very closely linked empirically, perhaps even in a causal manner. With these important caveats in mind, we proceed to the discussion.

[29] Note that established loci from the largest genome-wide association study (GWAS) to date on BMI account for only 2.4 percent of the variation in BMI (Schmitz & Conley 2016). This could be due to the importance of gene—environment interactions, and/or that genetic factors are not so important after all for BMI.

6.2 Hiring, firing, and health

The following discussion is structured 'chronologically'. We start off with hiring and (temporary) employment, proceed to firing and unemployment, and end the section with health effects of unemployment.

6.2.1 Hiring and (temporary) employment

High labor force participation is an essential goal throughout Europe (see e.g. European Commission 2010), and labor market *deregulation* has been implemented in several European countries since the 1990s in order to fulfill this goal (Gebel & Giesecke 2016). Weaker employment protection legislation (EPL) and making it easier for employers to hire employees temporarily are the perhaps two most common deregulation instruments.

There are two main perspectives on how deregulation will influence labor market attachment for 'vulnerable groups': *integration* on the one hand, and *segmentation* on the other (Gebel 2010). The labor market *integration* perspective emphasizes that deregulation could be positive for 'vulnerable groups' (e.g. people with ill health). Strong employment protection will make it difficult for 'outsiders' to enter the labor market, both because it is difficult to fire older and less productive employees, and because employers worry about potential firing costs if the newly hired employee is a bad match. In addition, temporary work contracts will act as a kind of prolonged probationary period (Gebel 2010: 643), enabling the employers to more accurately screen and assess the (temporary) employee. If he/she fulfills (or surpasses) the requirements, the reward will be a permanent contract, since the employer does not want to lose him/her to a competitor.

Labor market *segmentation*, on the other hand, highlights that deregulation could lead to a further polarization of the workforce, i.e. that the divide between insiders and outsiders will become larger. For instance, individuals possessing an 'uncertainty signal' could be trapped in a vicious circle consisting of temporary work contracts and repeated unemployment episodes. Correspondingly, a recent study showed that making it easier for employers to hire temporarily increased rates of temporary work among youth in Europe, but did not reduce unemployment likelihood (Gebel & Giesecke 2016). In other words, more temporary work contracts do not seem – in general – to act as a 'stepping stone' into permanent employment for younger workers. To have bad health is unquestionably a stronger 'uncertainty signal' than being young, as health problems often get worse with advancing age, while being inexperienced can be amended quite easily once employment is gained the first

time. Thus, labor market deregulation will probably not be beneficial for people with health problems, when it apparently does not work well for younger workers. The results from this dissertation actually indicate that deregulation might be particularly harmful for people with ill health.

The Danish 'flexicurity' labor market model is characterized by a high worker- and job turnover rate, made possible by the lenient hiring/firing legislation (Andersen & Svarer 2007; Madsen 2004). This higher *mobility rate* will probably have a negative impact on how well people with ill health are integrated into the labor market, because they have to partake in more recruitment processes on average (at least compared with their Norwegian and Swedish counterparts). Hence, the process of *cumulative disadvantages* (DiPrete & Eirich 2006; Merton 1968) will probably be more distinct, the more hiring/firing decisions people with ill health experience. There is some evidence of this being the case, as indicated by the comparatively low employment rate (and the larger share of temporary work contracts) among people with health problems in Denmark.

As discussed above (section 3.1.1), weak EPL could act as an incentive for employers, resulting in a changed *candidate ranking* in favor of people possessing a signal of 'uncertainty' (e.g. bad health). This is, however, unlikely to be the case. Employers wish to hire the best possible candidate in each and every recruitment process, and will tend to choose candidates with few associated risk factors. Thus, the strength of EPL is probably not important at all for the candidate ranking[30]. Furthermore, the use of *probationary periods* in many occupations acts as a 'screening device', and it is therefore unnecessary to introduce weak EPL and/or open up for more temporary work contracts as well.

People with ill health are twice as likely to hold temporary work contracts as those with good health in Denmark, perhaps a 'side effect' of the 'flexicurity' model. Due to cumulative disadvantages, individuals with health problems end up with a weak attachment to the labor market. There is, to a lesser extent, a health component in the use of temporary work contracts in Sweden as well. Recall that temporary work contracts are much more widespread in Sweden (14 percent) than in Denmark and Norway (7-8 percent) (Eurostat 2016c). It therefore seems as if the combination of strong employment protection and low prevalence of temporary work contracts, as in Norway, is the most favorable institutional set-up for people with health problems. In conclusion, deregulation is clearly related to labor market *segmentation* for people with ill health, at least in the Scandinavian context.

[30] The strength of employment protection could, of course, have an impact on whether the employer opts for a new employee altogether, but that is not the issue here.

As noted above, the worker turnover rates are quite high in the Danish 'flexicurity' model, and it is therefore interesting to have a glance at previous research from other countries with high mobility rates. Having a serious mental illness was associated with weak labor market attachment in the US, whereas people with alcohol- or drug-related disorders were not especially disadvantaged (Baldwin & Marcus 2014). Note that the economy was booming in the USA during the investigated time period (2001-2005), in contrast to the economic downturn influencing the current dissertation. Hence, it is not necessarily the case that people with (serious) health problems will be easily integrated into the labor market as soon as the economy improves again, but those with less visible conditions (e.g. alcohol problems) could be. Similar patterns are also evident in the U.K. (Minton, Pickett & Dorling 2012; Bartley & Owen 1996) and Norway (van der Wel, Dahl & Birkelund 2010), where people with ill health (and low education) struggled to re-enter the labor market following recessions. In other words, *a rising tide lifts all boats, except when there is a small leak.*

6.2.2 Firing and unemployment

The investigated time window (2007—2013) has been heavily influenced by an economic downturn, and the unemployment experience has become considerably more widespread. Since unemployment is correlated with a number of negative events – such as income drop and human capital devaluation – it is important to examine whether 'vulnerable groups' are overrepresented among the unemployed. Furthermore, it is of high policy relevance to investigate whether certain institutional settings are able to improve the situation for people who traditionally are at a disadvantage on the labor market.

The strength of employment protection legislation (EPL) is of obvious importance for firing decisions and unemployment likelihood (see section 3.1.1). In Denmark, where EPL is weak, there is a high unemployment risk for people having or developing a health problem. This is an unsurprising, but important finding. It is to be expected that rational and profit-maximizing employers wish to 'get rid of' the most unproductive parts of the staff during redundancies. People with bad health status represent both an immediate cost (due to sickness absence) and a potential risk factor (health status might deteriorate further), and are thus likely to be among the first to be fired. As noted above, this could be the start of a process of cumulative labor market disadvantages, and the unemployment spell could become especially long (and the CV gap equally large) for people with ill health due to problems in re-gaining employment. Experimental evidence has shown that there is a causal relationship between

long-term unemployment and a low call-back probability (Eriksson & Rooth 2014; Oberholzer-Gee 2008), and this even holds within occupations with high demand for labor (Birkelund, Heggebø & Rogstad 2016). Hence, re-entry to the labor market could prove difficult for people (with ill health) who experience long-term unemployment during the current economic crisis.

There could be a fairness issue at stake here as well. It is not unreasonable for an employer to fire a worker who has such a bad health status that it lowers his/her productivity level noticeably, especially when the survival of the firm is at stake in the face of an economic downturn. However, the health problem might be rather transitory, implying that he/she would be as (or even more) productive compared with the remaining coworkers after a short while. A stronger EPL would in this case be able to protect people with ill health from unfair dismissals.

That people with ill health have a high unemployment likelihood is not a new and exciting research finding in itself, but the fact that health selection to unemployment apparently varies with the strength of EPL is both a novel and important result (see Reeves et al. 2014 for a multilevel study of this topic). In Norway and Sweden, where employment protection is quite strong, there is no evidence of health selection to unemployment, except among the young (<30 years). This is, in fact, quite surprising given the voluminous research literature (see section 2.2.1) establishing health selection as a general phenomenon. Reasonably strong employment protection therefore seems to be a prerequisite for stable labor market attachment for people with health problems. This finding could be relevant for other 'vulnerable groups' as well, such as immigrants/descendants and people with CV gaps, who probably experience some of the same mechanisms on the labor market (see section 2.3.2) as those with bad health do.

Weak employment protection has been suggested as a policy instrument[31] in order to improve labor market attachment for 'vulnerable groups' (IMF 2014; OECD 2013). This does, however, not seem to be the case when we investigate it empirically with a focus on people with ill health. The question therefore arises: what kind of labor market policies should be implemented instead? In addition to reasonably strong EPL and low prevalence of temporary work contracts, it could be a good idea to implement *quotas* or preferential

[31] "[Relaxing employment protection legislation] should also help reducing labour market duality and provide more opportunities to outsiders to get into career job paths. In addition, the evidence also suggests that a number of workers will benefit from these reforms because greater job creation will allow better matches and higher wage premia to job change." (OECD 2013: 107).

employment for people with health problems in firms of a certain size (e.g. at least 50 employees). *Wage subsidies* can also be used to minimize the uncertainties that employers face when considering hiring a person with ill health. Temporary subsidies are used if the uncertainty is only related to whether the person is able to do the required work or not. The size of more permanent subsidies is set depending on how much the specific health problem lowers the person's productivity level.

Paper 4 shows that people with ill health tend to be overrepresented among the recently unemployed in most European countries when the economy takes a turn for the worse, indicating that employers do in fact view bad health status as a risk factor. This is not surprising since analysis of experimental data have documented that even subtle obesity signals lowers call-back probability from employers (Rooth 2009). There are very few jobs were being somewhat overweight is directly related to productivity, suggesting that 'irrelevant' health signals can have a vital impact on labor market outcomes. Hence, even though the health problem is unrelated to job performance, the person could face a heightened unemployment risk during an economic downturn. Only in countries experiencing a full-blown crisis do people with good health status 'bear the brunt' of the labor market disadvantages, and this is purely due to numerical reasons (i.e. more common to have good than bad health). In the remaining countries, employers are – to some extent – using the economic downturn to 'throw out' people with health problems (e.g. see table 6 in paper 4).

6.2.3 Health effects of unemployment

The well-known statistical association between unemployment and ill health consists of two major processes. We have discussed health-related social mobility ('health selection') thus far, but now attention is turned to health effects of unemployment ('social causation'). Unemployment is clearly associated with a range of undesirable events, and it might even be harmful for health and wellbeing. Moreover, there could be cross-national differences in the negative effect of unemployment on health, for instance because of differing unemployment benefit generosity (implying more/less financial hardship).

Accordingly, paper 3 examines whether health effects are more noticeable in Sweden, where unemployment benefits are considerably less generous than in Norway and Denmark. The results indicate that this is not the case, and the health effects of unemployment are apparently more pronounced in Denmark, despite benefits being rather generous there. This does not imply, however, that unemployment benefits are trivial for health and wellbeing

among the unemployed. On the contrary, the Scandinavian countries seems to have been reasonably successful in preventing the unemployed to deteriorate in health, and rather generous unemployment benefits is likely an important contributing factor. The fact that Swedish unemployed are not worse off is probably related to the more important role of unions and collective agreements in the Swedish institutional set-up (Sjöberg 2011: 223-224). Hence, the income loss for the unemployed is probably not as big as indicated by the replacement rates in OECD (2016d). Note that only *short-term* health effects have been examined (due to the short panel data set), and the more long-term impact of unemployment on health could still be grimmer in Sweden.

There is widespread fear among both politicians and researchers that a generous unemployment benefit will act as a disincentive to actively search for a new job among the unemployed. Although this fear probably is relevant in certain cases, it is important to make sure that the benefit is not too meager either. An inadequate benefit level could lead numerous unemployed individuals (and their households) to experience poverty/ financial hardship, with potentially health damaging effects for the unemployed person and his/her children. Furthermore, it could 'force' people into accepting jobs below their skill level (i.e. labor market mismatch), resulting in worse work conditions and lower lifetime earnings. It is also important to stress that most unemployed people are probably more than willing to work, because of all the positive aspects associated with holding employment (income, self-worth, network, social integration in the local community, etc.). Hence, the vast majority of the unemployment population wants to find a new job, but the overall state of the economy does not allow them to.

According to paper 3, the health effects of unemployment are quite noticeable in Denmark. There are similar signs in paper 5 as well, where Denmark has the largest effect size (out of 25 countries) for being unemployed on self-rated health (see table 4, column 1). Why is this so? It could, in fact, be related to stress imposed by the extensive use of active labor market policies (ALMP). Not all unemployed people will benefit from such policies, and it might even be experienced as degrading. This is perhaps especially true for individuals with a lot of work experience and/or higher educational qualifications, who will gain the least from job search- and work training- schemes. The finding that Danish unemployed fare quite bad on health outcomes corroborates well with a recent study of 24 European countries. Buffel, Beckfield & Bracke (2016) document that both GP and psychiatrist consultation rates

are comparatively high among the unemployed in Denmark[32] and the Netherlands, two countries with a 'flexicurity' labor market model. This could indicate that the extensive use of ALMP might come at a cost, in the sense that some unemployed people deteriorate in health due to the associated stress.

The results from paper 5 documents that unemployment tends to hurt self-rated health in most of the included 25 European countries[33], although not very much in the short-term. The tendency is nevertheless worrying, taking into account the large number of unemployed people in current-day Europe. If health status continues to deteriorate as the unemployment spell is prolonged, European welfare states could be facing a public health challenge in the following years, with higher disability prevalence and increasing expenses due to use of medication and health care. In order to prevent this scenario, the unemployed should (i) receive reasonably generous benefits while out of work, and (ii) be helped back into employment as soon as possible. We elaborate somewhat on the latter point below.

People who are currently out of work will not necessarily be easily integrated into the labor market when the economy is 'booming' again. People with unemployment episodes on the résumé are disadvantaged in recruitment processes, because employers view this 'gap' as an uncertainty signal: The candidate has possibly lost his/her job because of low productivity, and has clearly been rejected by several other prospective employers (probably because he/she was considered to be a 'bad hire'). Moreover, time spent unemployed has led to human capital devaluation, and the skills he/she possesses are therefore dated (to what extent this is true obviously depends on the specific occupation). Use of ALMP could help people with 'unemployment scars', but such policies are, as mentioned above, not equally well suited for the unemployed in current-day Europe. For 'high-skill' unemployed, it might be more appropriate to introduce policy instruments that allow them to compete on similar terms as people with a seamless employment history on the labor market. Since June 11th 2013, employers and employment agencies are prohibited from using an applicant's unemployment history during hiring decisions in New York City (NYC Council 2013). Similar extensions of anti-discrimination laws could be implemented in European countries as well.

[32] The difference in results between Denmark and Sweden are quite striking (no data for Norway). For instance, the unemployed consult GPs (b= 0.077) and psychiatrists (b = 0.054) to a significantly larger extent than the employed in Denmark even after statistical adjustment for mental health. In Sweden, on the other hand, the unemployed are slightly less likely to consult GPs and psychiatrists than the employed (b= -0.052, -0.012).
[33] The treatment effects are very similar for men and women in 18/25 countries, somewhat larger for women in Denmark and Malta, and somewhat larger for men in Cyprus, Italy, Slovenia, Czech Rep., and Iceland.

There were (surprisingly) little cross-national differences between the 25 included countries in the health effects of unemployment according to paper 5. It was mostly the countries with a very low unemployment rate that differed from the others, and no 'gradient' (i.e. smaller effect size, the higher the unemployment rate) was discernible in either the FE or the PSM analysis. This implies that *less stigma/self-blame* is unable to account for the empirical pattern[34]. Health effects of unemployment should be noticeably smaller in countries where unemployment is clearly a structural problem, than in countries with a more intermediate unemployment level. This is, however, not the case, and we need to look elsewhere for an explanation of the (minor) cross-national differences. The '*economic climate*'- hypothesis also receives scant support. Detailed inspection of effect sizes for countries where the unemployment rate was on a similar level, but where the trends differ (growing vs. falling), revealed no noticeable pattern. Hence, it is unlikely that the prevailing economic conditions in a country are the most important explanatory factor for health and wellbeing among the unemployed (from a cross-national comparative perspective).

The fact that the low-unemployment countries differed empirically indicates that the *composition* of the unemployment population is vital for how well the unemployed deal with the experience on average. In countries where the unemployment rate is higher, there are more 'high-skill' individuals out of a job as well, who most likely will deteriorate less in health, for several reasons (Mandemakers & Monden 2013). First, their health behaviors tend to be better on average. Second, they have often had less physically demanding work in the past. Third, their social network could be both larger and of higher quality (i.e. more social support from friends, family and previous coworkers). Fourth, they have more savings to 'fall back on' during unemployment. In total, this means that these 'high-skill' individuals have better resources for withstanding health deterioration during an unemployment spell.

On the other hand, it could be argued that being unemployed is worse for people with more work experience and higher educational qualifications, both because their *identity* is more closely linked to employment (Cohn 1978: 88) and because the associated *income drop* is larger. However, in the midst of an economic crisis, it is probably reassuring to know how to 'play the game' during recruitment processes, and to have relevant work experience on the CV will influence his/her perception of how likely it is to gain re-employment. In contrast,

[34] The following discussion is located on the 'macro-level', and we wish to explain (lack of) cross-national differences in results. Hence, it does not imply that stigma/self-blame is unimportant for the unemployment—health relationship on an *individual* level. On the contrary, these processes are probably vital as explanatory factors. This applies to the 'economic climate' hypothesis as well.

people with less educational qualifications and work experience will probably perceive their own labor market chances as rather grim in comparison[35]. It is therefore highly likely that this kind of 'positive selection' to the unemployment population is an important piece of the explanatory puzzle for why unemployment—health relationship differs empirically, both between countries and over time.

What implications, if any, do the presented findings have for *social inequalities in health*? In the short term, health inequalities according to *employment status* (i.e. unemployed—employed health differentials) could decrease in several European countries, due to the above-mentioned 'positive selection' to the unemployment population. Health inequalities according to *educational qualifications*, on the other hand, probably tell a completely different story. People with low education (and bad/vulnerable health status) will most likely struggle to re-enter the labor market, and the stress and financial hardship associated with prolonged unemployment could cause their health status to deteriorate. Hence, the end result could be widening educational inequalities in health.

6.3 Conclusion

There are four major 'take-home-messages' in this dissertation. First, labor market deregulation (e.g. more temporary work contracts) does not seem to be beneficial for people with ill health, and will therefore probably not work for other 'vulnerable groups' either. Second, although people with health problems tend to be among the first to lose their jobs during an economic crisis, stronger employment protection legislation could improve the situation. Third, the Scandinavian welfare states have apparently kept the unemployed in good health, showing the importance of (reasonably) generous unemployment benefits. Hence, the 'Norwegian model' (see table 1, section 3.1.2), with a combination of strong employment protection and generous unemployment benefits, seems to be the best one. Fourth and finally, the composition of the unemployed population is of vital importance for why the unemployment—health relationship varies over time and between countries.

Future research on the association between ill health and employment status should follow two separate streams. Firstly, field experiments with health information included in the résumés should be implemented, in order to get a better grasp of the (potential) challenges that people with health problems face in recruitment processes. Secondly, statistical analyses

[35] Unemployed with fewer 'credentials' most often know (or hear about) people with higher educational level and loads of work experience who struggle to gain employment, and will therefore think that it is extremely unlikely for him-/herself to have any luck in the recruitment process.

of administrative registers covering the whole population with objective health information could also be an excellent supplement. There should preferably be included an explicit cross-national comparative component in both of these strands of research, so that the impact of differing policies and labor market models can be better scrutinized. More qualitative research is needed as well, for instance in-depth interviews with employers and hiring managers about the role health status play in recruitment processes. The more theoretical puzzle of why the unemployed tend to deteriorate in health is also a possible venue for qualitative research, where close follow-up of the unemployed with repeated interviews (and health screenings) is the perhaps most ideal design.

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Paper 1

Hiring, employment, and health in Scandinavia: The Danish ‘flexicurity’ model in comparative perspective. *European Societies* (2016), 18(5): 460-486.

EUROPEAN SOCIETIES, 2016
VOL. 18, NO. 5, 460–486
http://dx.doi.org/10.1080/14616696.2016.1207794

Hiring, employment, and health in Scandinavia: the Danish 'flexicurity' model in comparative perspective

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ABSTRACT

Previous research has shown that people with health problems often experience disadvantages on the labour market. Can weak employment protection increase employment prospects for people with ill health? In order to investigate this question, the longitudinal part of the European Union Statistics on Income and Living Conditions (EU-SILC) data material is utilised (2008–2011) and generalised least squares regressions are estimated. The research context is set to Scandinavia. Denmark, Norway, and Sweden are similar in many respects, but deviate on one important point: the employment protection legislation is considerably weaker in the Danish 'flexicurity' model. The lenient firing regulations could make employers more prone to take the 'risk' associated with hiring someone with a health problem, since the costs related to firing him/her are low. The results reveal that people with ill health have somewhat better hiring likelihood in Denmark than in Norway and Sweden. This pattern is, however, only evident among higher educated individuals. Furthermore, descriptive evidence indicates that the 'flexicurity' model seems to come at a cost for people with health problems: The employment rates are not high overall, and temporary work contracts are much more widespread in Denmark. Consequently, labour market attachment for people with ill health remains rather 'loose' in the Danish 'flexicurity' model.

ARTICLE HISTORY Received 4 November 2015; Accepted 13 June 2016

KEYWORDS Hiring; employment; health selection; flexicurity; Scandinavia

1. Introduction

Europe is currently struggling with a deep and long-lasting economic crisis,[1] resulting in high unemployment rates in several countries. In the 28 European Union member countries, the unemployment rate increased from 7% in the start of 2008 to 11% in 2013 (Eurostat 2015a). Correspondingly, there has been a renewed research interest in unemployment (e.g. Stuckler *et al.* 2009; Karanikolos *et al.* 2013; Norström and Grönqvist

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[1]'Economic crisis' and 'economic downturn' will be used interchangeably in this paper.

2015). However, there is considerably less energy devoted to *hiring and employment*, which is the topic of the current study. During a crisis, employers have more applicants to choose among for each available job opening, and individuals with some kind of negative signal attached to their résumé are therefore less likely to be hired. To have bad health status is one type of negative signal, and this paper asks: *Are people with ill health less likely than people who report good health to gain employment in a period with low labour demand?*

Ill health is measured in two ways in the current study: (i) those reporting bad/fair health and (ii) those stating to have a limiting long-standing illness (LLSI). The research context is set to Denmark, Norway, and Sweden. Although the Scandinavian countries share a whole range of characteristics, there is especially one critical difference. The Danish 'flexicurity' labour market model has lenient hiring and firing regulations as one of its core elements (Heyes 2011; van Kersbergen and Hemerijck 2012), and it is therefore quite easy for a Danish employer to fire an employee. In contrast, employment protection legislation (EPL) is strong in both Norway and Sweden. Because the costs of firing someone are low in Denmark, this could imply that Danish employers tend to 'take the risk' associated with hiring someone with bad health. Norwegian and Swedish employers, on the other hand, could be more reluctant to hire a person with ill health. The candidate could, for instance, tend to be less productive because of the impaired health status, and with strong EPL it will be more difficult (and hence more costly) to fire him/her. The second research question is thus *whether the 'flexicurity' labour market model – with weak employment protection – is an advantage for people with ill health's hiring probabilities*.

To investigate individual hiring probabilities is obviously important, because it will demonstrate the mobility flow (or lack thereof) for people with health problems. However, it is also interesting to explore how people with ill health perform 'as a whole' on the labour market. Permanent employment is unquestionably the best way to ensure a firm attachment to the labour market. Accordingly, this paper will look into overall employment rates and the use of temporary work contracts for people with ill health, and compare the rates to people reporting good health. The third and final research question is hence *how firmly attached to the labour market are people with ill health in Scandinavia?*

In order to investigate these questions, the longitudinal part of the European Union Statistics on Income and Living Conditions (EU-SILC) data material is utilised (time window: 2008–2011). Here, we can follow

the same individuals for a maximum of four years, and see whether people with ill health have lower hiring probabilities than those with good health status. The models are estimated with generalised least squares regression (GLS). Since the EU-SILC data material is harmonised for comparative purposes, we can compare labour market outcomes for people with health problems between Denmark, Norway, and Sweden.

The current study adds to the existing literature on health and employment status on two areas. Firstly, by investigating hiring and employment patterns during an *economic downturn*. The low labour demand implies that it is possible for employers to 'skim the cream' to a higher extent, because of a larger amount of applicants for each available job opening. 'Cream-skimming' means that employers get to handpick employees, and people with health problems might therefore be in a particularly vulnerable position on the labour market during a crisis. Secondly, through an explicit *comparative focus* on the health–employment relationship. Potential differences in results between Denmark on the one hand and Norway and Sweden on the other could indicate whether the 'flexicurity' model is favourable for individuals who traditionally struggle on the labour market, here exemplified by people with ill health.

2. Theory and previous research

2.1. Explanatory mechanisms

There are four possible mechanisms able to explain why people with ill health are 'picked last' in the recruitment process (Hedström and Swedberg 1996; Hedström 2005). First, employers are *profit maximising*, and therefore wish to hire the most productive employees. In an effort to do so, the employer might look for signals of physical/mental strength (e.g. few sick days). Second, employers are *risk-averse* (Aigner and Cain 1977). To hire someone with bad health represents a risk factor because he/she could deteriorate further in health, possibly implying high sick leave (followed by an expensive firing decision, and a time-consuming recruitment process). Third, employers might *discriminate* against people with ill health (Becker 1971 [1957]; Arrow 1973), either because they dislike people who are unfit, or because they believe health to be correlated with undesirable personality characteristics (e.g. low levels of conscientiousness). Fourth, because of the *scarring effects* of unemployment (Oberholzer-Gee 2008; Eriksson and Rooth 2014). Other employers might have emphasised one or several of the abovementioned factors,

and the job applicant with ill health could have struggled to gain employment in previous application processes, implying more unemployment on the résumé. Employers could therefore be sceptical about him/her not because of the health status, but rather because of the accumulated amount of unemployment (a signal of low productivity).

Unfortunately, the current data material is not well suited for distinguishing between the abovementioned mechanisms. What the EU-SILC data *are* suited for, however, is cross-national comparisons of results, and potential differences between the Scandinavian countries could be of interest from a policy point of view. If the employment prospects for people with ill health are better in Denmark, this could indicate that weak employment protection is one way to improve the situation for individuals with a rather 'loose' labour market attachment.

2.2. Health and employment status

Previous research has established a robust relationship between health and employment status. Analysis of 11 European countries showed that healthier people were more likely to become – or remain – employed than less healthy people (Schuring *et al.* 2007). Similarly, impaired health status was associated with longer unemployment spells in both Canada (Stewart 2001) and Australia (Butterworth *et al.* 2012). Furthermore, workers with ill health were less likely to return to work after unemployment in the Netherlands (Schuring *et al.* 2013) and in Britain (García-Gómez *et al.* 2010). It is not obvious, however, that these findings are generalisable to the Scandinavian context, where employment rates are comparatively high. A Swedish study found that the association between subjective mental distress (GHQ-12) and re-employment rate was insignificant once a number of covariates was included in the regression (Skärlund *et al.* 2012).

Having ill health could be particularly disadvantageous when the demand for labour is low, because employers are more able to 'skim the cream' in the recruitment process. In line with this argument, a study from Britain (observational period: 1973–1993)[2] found that people with ill health struggled to re-enter the labour market in the aftermath of economic downturns (Bartley and Owen 1996). Similar results were observed for Norway in the years 1980–2005 as well (van der Wel *et al.* 2010). The

[2]See Minton *et al.* (2012) for a similar study of newer date.

current study will investigate if people with ill health struggle to enter the labour market during the current economic crisis, and asks:

I. Do people with ill health have a lower probability of gaining employment than people with good health during the economic downturn in Scandinavia?

2.3. Scandinavia: institutional context

Denmark, Norway, and Sweden all have high tax levels, free or heavily subsidised education, and a universal health care system. Furthermore, the countries share an emphasis on work and employment being the single most important mean for integration and social participation (Lødemel and Trickey 2001; Bengtsson 2014). Hence, the respondents in the study samples live in countries that are organised in a comparable manner, ensuring that the cultural dissimilarities are few. Nonetheless, we have to consider (potential) cross-national differences relevant for the relationship between ill health and employment status.

A first important difference concerns overall demand for labour in Scandinavia 2008–2011 (see Figure A1 in the appendix). The unemployment rate has been roughly 3% in Norway and between 6% and 8% in Sweden. There was a rapid increase from 3.5% to 7.8% in Denmark 2008–2011. Denmark (7.6) and Sweden (7.8) are experiencing similar unemployment levels in 2011, while labour demand is considerably higher in Norway. Thus, it is particularly interesting to compare results for Denmark and Sweden in 2011.

In the years 2010–2014, the employment rate for 20–64-year-olds has been approximately 76% in Denmark, and 79–80% in Norway and Sweden (Eurostat 2015b). The share of temporary work contracts in the same age- and time span is low for Denmark and Norway (7–8%), while Sweden is on a higher level at roughly 14% (Eurostat 2015c) due to legislative amendments in 2003 and 2007. The share of employees in the public sector is comparable in the three countries: 32.6 in Sweden, 33.6 in Denmark and 35.4% in Norway (Dølvik *et al.* 2015). Overall, the industries of the three Scandinavian labour markets are very similar (*Nordic Statistical Yearbook* 2014, see Table 8.2). Manufacturing and other industry make up a similar share of the labour market in Denmark (13.9), Norway (13.0) and Sweden (12.6), but the service sector is somewhat larger in Sweden (15.2) than in Denmark (11.2) and Norway (11.4). There are some slight differences in average retirement age: 62.3, 63.5 and 64.4 in Denmark, Norway, and Sweden, respectively,

in 2010 (Halvorsen and Tägtström 2013), and it is therefore important to include age in the regressions.

Apart from employment rates being somewhat lower in Denmark, and the more widespread use of temporary work contracts in Sweden, there are few differences between the countries in how the labour markets are organised. Perhaps more relevant, however, is the generousness of the unemployment benefits. If the benefit is very generous, people with health impairments might be less inclined to search for a (new) job. A short-term unemployed single person without children on average wage would in 2012 receive 65% of previous income in Norway, 57% in Denmark, and 45% in Sweden (OECD 2015a). Hence, there might exist a larger 'incentive' to stay unemployed in Norway, and this is worth remembering while interpreting the results.

It is more challenging to compare the countries regarding disability benefits, because the benefit is means-tested in Denmark, while previous income level is the basis in Norway and Sweden. Luckily, EU-SILC includes disability data, and we can investigate whether there are cross-national differences in the extent to which people with ill health report 'disabled' as economic status (see Table A1 in the appendix). In general, both men and women with ill health in Sweden report being disabled less often than their neighbouring counterparts do in 2011. This is probably a reflection of the stricter eligibility criteria for disability benefits introduced in recent years (Hägglund 2013; Lidwall 2013). The differences between Norway and Denmark are minor, although Norwegians with ill health are disabled to a slightly higher extent.

To summarise, Denmark, Norway, and Sweden are similar on many domains, and to compare results across these countries is therefore possible. However, there is one important difference between the Scandinavian countries, which is the topic of the subsequent section.

2.4. The 'flexicurity' labour market model

The Danish 'flexicurity' labour market model consists of three main parts: (i) minimal job protection, (ii) generous unemployment benefits, and (iii) extensive use of active labour market policies (Heyes 2011; van Kersbergen and Hemerijck 2012). Accordingly, there is a high level of worker- and job turnover rate, made possible by the lenient hiring and firing legislation (Madsen 2004; Andersen and Svarer 2007). It is especially among skilled and unskilled workers that the employment protection is weak, while employers have less flexibility in dismissing traditional 'white

collar' employees (Jensen 2011). Hence, there is an important *skill component*: hiring and firing regulations are more lenient in low-skill occupations, while higher skilled employees are protected to a larger extent.[3]

The impact of EPL on labour market attachment will probably be especially important for vulnerable groups, such as people with health problems. Results from a study of 26 European countries indicate that stricter EPL is able to lower the firing likelihood for people with ill health, but only in countries facing less severe or no economic crisis at all (Reeves *et al.* 2014). Similarly, we might expect EPL to have an impact on employers' *hiring* decisions. The flexible legislation in Denmark could imply that employers are more inclined to take the 'risk' associated with hiring a person with bad health status. If the newly hired employee turns out to be unproductive – e.g. has too many sick days, or is not fit enough to do the job – the employer can simply fire him/her, without worrying about any major costs involved. This is different for Norwegian and Swedish employers, who have to take more rigorous EPL into account while considering whom to hire. The strong EPL in these two countries could mean that people with ill health struggle to gain employment, because (risk-averse) employers worry about potential difficulties with how to fire people (with ill health) that turn out to be unproductive. Correspondingly, we ask:

II. Is the 'flexicurity' labour market model – with weak employment protection – an advantage for people with ill health's hiring probabilities?

Note that high sickness absence does not constitute proper grounds for dismissals under normal circumstances. Nonetheless, recent evidence has shown that respondents who deteriorate in health tend to lose their jobs in Denmark (Heggebø 2015). Moreover, sickness absence was considered important while deciding whom to fire in a Danish manufacturing company in 2010 (Svalund *et al.* 2013: 194). Thus, employers are apparently sensitive to (developing) health problems among employees, and it is reasonable to assume that health status is of importance in hiring decisions as well.

Although hiring probabilities are important, it is perhaps equally interesting to investigate how people with ill health perform 'as a whole' on labour market outcomes. Here it will be particularly rewarding to compare Denmark and Sweden, who experienced quite similar demand for labour in 2010–2011. Employment rates and the use of temporary

[3]This 'duality' is probably the main reason for Denmark (2.10) not being very different from Norway (2.23) and Sweden (2.52) on the OECD employment protection index for individual dismissals for permanent workers (OECD 2013).

work contracts will therefore be explored, in order to answer the third and final research question:

III. How firmly are people with ill health attached to the labour market in Scandinavia?

3. Data and method

3.1. Data

The longitudinal part[4] of the EU-SILC was utilised in the present study. These panel data are structured in a rotary format, where individuals are followed for a maximum of four years (2008–2011). The panel is unbalanced, which means that not everyone is followed for four consecutive years. Often, there are only two or three observations for each individual. Due to this shortcoming, it is not sensible to follow people from one year to the next and use a change variable (e.g. unemployed 2008 to employed 2009) as the outcome measure. This implies that a (potentially) large number of employment status transitions would get lost, yielding problems with statistical power. All transitions happening before the respondent was included in the sample would also go unrecorded. This is especially important for the current study, since the outcome is an infrequent event (159, 343 and 331 hirings for Denmark, Norway, and Sweden, respectively) due to the economic downturn.

Luckily, EU-SILC includes a question that enables us to deal with these difficulties. The respondents are asked about the *most recent change* (during the last year) in employment status, which means that individuals gaining employment during the year before he/she was included in the sample is recorded. Similarly, respondents who gained employment in 2009, but only contribute with information in 2008 and 2010, are also registered.

Because the EU-SILC data are harmonised for comparative purposes, we are able to examine whether there are cross-national differences in labour market attachment among people with ill health. Information is gathered on an individual level throughout Scandinavia. People not selected for answering health questions are dropped from the sample, along with those with missing information on health variables (81 observations). Moreover, people below the age of 16 are not included, yielding a total sample of 38 922 observations. We place no further restrictions on the sample, for two reasons. First, due to the large time span between survey rounds

[4]Pooled EU-SILC cross-sections are not preferable, because it is not possible to localise individuals contributing with several observations.

(minimum one year), a large number of initially employed people are likely to experience unemployment and re-employment[5] before follow-up. Second, even people once stating to be retired, disabled or students gain employment in the present data material, although it is quite uncommon.

3.2. Operationalisation

Dependent variable in the following analysis is *hiring*, a dummy variable based on a question regarding most recent change (i.e. during the past 12 months) in employment status. People who state that they have went from unemployment or being economically inactive to employment are coded 1 (else = 0). The most important independent variable is *bad/fair health*, a dichotomised measure computed from a question on self-assessed health status. People reporting very bad, bad or fair health are coded 1 (very good or good = 0). Those with fair health are included for two reasons. Firstly, because the number of respondents stating to have very bad or bad health is low (5.7%, 6.9%, and 5.0% in Denmark, Norway, and Sweden, respectively), yielding problems with statistical power. Secondly, even people with less serious health impairments could face difficulties in gaining employment. To check the robustness of the results, the health measure is changed to *limiting long-standing illness* (LLSI) in all model specifications. Two questions are used: whether the respondent suffers from a chronic long-standing illness, and whether the respondent is limited in activities people usually do because of health problems. People answering yes on both are coded 1 (else = 0).

LLSI should capture respondents with quite serious (and for employers: more visible) health challenges, whereas *bad/fair health* is comprised of a more heterogeneous health population. It is therefore likely that the more visible health measure will yield stronger negative effects (i.e. people reporting LLSI should have lower hiring probabilities than those with bad/fair health). The correlation between the two health measures is 0.514, 0.521, and 0.526 in Denmark, Norway, and Sweden, respectively, implying a moderate to strong association (Cohen 1988). The fact that the correlation is not even higher indicates that these measures are capturing somewhat differing aspects of health. More objective health measures would obviously have been preferable, but the reliability of self-reported indicators seems to be acceptable (Martikainen *et al.* 1999).

[5]A respondent could easily have status as 'employed' in both 2008 and 2009, but still have experienced losing a job and gaining employment between the two survey rounds. This is actually quite common in the current data material.

Table 1. Descriptive statistics, by country and gender (%).

	Denmark		Norway		Sweden	
	Men	Women	Men	Women	Men	Women
Hiring	1.63	1.77	2.08	2.40	1.82	2.78
Bad health	23.54	26.00	19.88	24.43	18.35	22.37
LLSI	12.76	17.68	10.75	17.20	12.80	18.49
Educational level						
Primary educ.	21.78	24.58	19.84	21.43	18.97	17.50
Secondary educ.	45.21	36.05	42.99	39.48	52.98	46.63
Higher educ.	29.40	35.15	32.48	34.45	24.29	33.04
Age						
Young age (<30)	12.16	10.67	18.58	18.82	19.95	17.36
Prime age (30–59)	50.13	57.50	54.73	53.50	45.20	46.73
Old age (>60)	37.71	31.83	26.69	27.67	34.85	35.91
Married	64.38	59.65	50.58	46.05	46.11	45.90
N	4357	4976	8043	7336	6686	7519

A number of covariates are included in the analyses. The dummy variable *woman* takes the value 1 for women, 0 for men. Educational qualifications, based on the highest International Standard Classification of Education level attained, consist of three dummy variables. Pre-primary, primary, and lower secondary is collapsed to *primary education*. (Upper) secondary and post-secondary non-tertiary is collapsed to *secondary education* (*higher education* = reference category). Age is derived from questions on year of birth and year of survey, and is thereafter recoded into three dummy variables: *Young age* (≤30 years), *old age* (≥60 years), and *prime age* (30–59 years, the reference category). The dichotomous measure *married* takes the value 1 if the respondent is married (else = 0). In order to see how 'firmly' attached people with ill health are to the labour market, the dummy variables *employment* (currently employed coded 1, else = 0) and *temporary work contract* (temporary = 1, permanent = 0) will be investigated.

3.3. Descriptive statistics

Table 1 presents descriptive statistics[6] stratified by country and gender. The hiring rate during the investigated time window is very low[7] in all three countries, reflecting the economic crisis. The rate is lowest among Danish men (1.63) and highest among Swedish women (2.78). Women report significantly[8] more ill health – both bad/fair health and LLSI –

[6]See Tables 4 and 5 for descriptive statistics on employment and temporary work contract in 2011.
[7]In absolute numbers: 159, 343, and 331 hirings for Denmark, Norway, and Sweden, respectively. The corresponding numbers for people with bad/fair health are 54, 69, and 48.
[8]Significance tests of descriptive statistics are available on request.

than men throughout Scandinavia. The amount of reported ill health is similar between the three countries (e.g. LLSI for men: 12.76, 10.75, and 12.80 in Denmark, Norway, and Sweden, respectively).

Educational level is distributed quite similarly in the three Scandinavian countries. Women have higher education to a somewhat larger extent in all three countries, and the 'gender gap' is largest in Sweden. There are comparatively few respondents below the age of 30 in Denmark and somewhat fewer older respondents in Norway. Respondents are married to a higher extent in Denmark, while the differences between Norway and Sweden are negligible. These minor cross-national differences in covariates are unlikely to cause large problems for the following analysis, and the main pattern is that of similarity.

Although the samples in the three countries are very similar overall, there might still be noticeable cross-national differences in observable characteristics among people reporting bad/fair health. Inspection of descriptive statistics for this subsample, however, does not indicate that this is the case (see Table A2 in the appendix). The three countries are still very similar, the main exception being the somewhat 'negatively selected' Swedish bad/fair health-sample. Compared to Denmark and Norway, Swedes reporting bad/fair health hold higher education to a lesser extent, report more often to have a limiting long-standing illness, and are more often above 60 years old. We need to remember this while interpreting the results.

3.4. Analysis

Linear probability models are performed throughout. Logistic regression analysis is not preferred because of difficulties in comparing results across different models, groups, and samples (Allison 1999; Mood 2010). Nevertheless, logistic regression is run as a robustness check because a linear model could be an incorrect specification. GLS are preferred over ordinary least squares (OLS) because the former corrects for the fact that we follow people over time (Allison 1994). Hence, robust standard errors are reported. OLS models with standard errors clustered on individuals have also been estimated, and the results are almost identical as those derived from GLS (see Table A3 in the appendix for an example). Calendar year dummy variables are included in the regressions in order to account for the differential demand for labour (and other time trends).

The analysis section is structured in the following fashion. First, we see whether people with bad/fair health are less likely to gain employment in

Table 2. Result from GLS regression of hiring, by bad/fair health and covariates.

	Denmark		Norway		Sweden	
	(1)	(2)	(1)	(2)	(1)	(2)
Constant	0.023***	0.030***	0.019***	0.019***	0.041***	0.040***
	(0.003)	(0.005)	(0.002)	(0.003)	(0.003)	(0.004)
Bad/fair health	0.008**	0.012**	−0.002	0.005*	−0.009**	0.003
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Woman		0.000		0.003		0.010***
		(0.003)		(0.002)		(0.002)
Young age		0.008		0.043***		0.037***
		(0.006)		(0.005)		(0.005)
Old age		−0.019***		−0.016***		−0.015***
		(0.003)		(0.002)		(0.002)
Married		−0.003		−0.003		−0.000
		(0.003)		(0.002)		(0.002)
Primary education		0.003		0.002		−0.015***
		(0.004)		(0.004)		(0.003)
Secondary education		0.001		−0.004		−0.006*
		(0.003)		(0.003)		(0.003)
R^2	0.003	0.010	0.001	0.020	0.008	0.024
Individuals	3362		5892		5752	
Observations	9333		15,379		14,205	

Notes: Reported standard errors (in parentheses) clustered on individuals. Calendar year dummy variables included in regressions.
Significance levels: ***.01; **.05; *.1 NS/(empty) ≥.1.

Scandinavia during the economic downturn. Afterwards we run the same models, but switch focus to people reporting more serious health impairments (LLSI). We then proceed to another sensitivity test, namely logistic regression analysis. Lastly, descriptive evidence on employment rates and the use of temporary work contracts is examined, in order to see how 'firmly' people with ill health are attached to the labour market.

4. Results

4.1. Hiring and health status in Scandinavia

Results from GLS regression of hiring by bad/fair health are presented in Table 2. Model 1 does not include any additional covariates, while model 2 adjusts for gender, age, marital status, and educational level. In the 'naïve' model, there is a significantly lower hiring probability for people reporting bad/fair health, but only in Sweden. The coefficient is negative but insignificant for Norway, and positive and significant for Denmark. The latter result even holds in model 2, where the reference group consists of 30–59 years old unmarried men with higher education. The coefficient is now positive and significant for Norway as well, but the effect size is smaller than in the Danish sample (0.005 vs. 0.012). People reporting bad/fair

Table 3. Result from GLS regression of hiring, by bad/fair health, educational level, and bad/fair health × educational level (panel a), bad/fair health, age, and bad/fair health × age (panel b), bad/fair health, gender, and bad/fair health × gender (panel c), or bad/fair health, marital status, and bad/fair health × marital status (panel d).

	Denmark	Norway	Sweden
Panel A. Educational level (ref.: higher education)			
Bad/fair health	0.016** (0.007)	0.002 (0.006)	−0.005 (0.007)
Primary education × bad/fair health	−0.017* (0.009)	−0.018** (0.008)	−0.003 (0.008)
Secondary education × bad/fair health	−0.007 (0.009)	0.001 (0.007)	0.001 (0.009)
Panel B. Age (ref.: 30–59 years)			
Bad/fair health	0.019*** (0.006)	0.004 (0.004)	0.010* (0.006)
Young age × bad/fair health	0.015 (0.028)	0.013 (0.016)	−0.013 (0.018)
Old age × bad/fair health	−0.017** (0.007)	0.000 (0.004)	−0.013** (0.006)
Panel C. Gender (ref.: men)			
Bad/fair health	0.004 (0.005)	0.002 (0.004)	−0.009** (0.004)
Woman × bad/fair health	0.006 (0.007)	−0.008 (0.006)	−0.000 (0.005)
Panel D. Marital status (ref.: unmarried)			
Bad/fair health	0.001 (0.006)	−0.004 (0.005)	−0.014*** (0.004)
Married × bad/fair health	0.010 (0.007)	0.002 (0.006)	0.012** (0.005)
Individuals	3362	5897	5752
Observations	9333	15,384	14,205

Notes: Reported standard errors (in parentheses) are clustered on individuals. Only the health coefficient and the interaction terms (health × covariate) is presented. Full models available on request.
Calendar year dummy variables included in regressions.
Significance level: ***.01; **.05; *.1 NS/(empty) ≥.1.

health do not differ in hiring probability for the Swedish sample in the adjusted model ($b = 0.003$, SE = 0.003).

Old age is associated with a lower hiring probability in all three countries, and young age is positively associated with likelihood of hiring in Norway and Sweden. Women have a higher probability of hiring than men in Sweden. Educational qualifications apparently matter more for labour market attachment in Sweden, where both the primary and secondary educated are worse off than respondents with higher educational qualifications. This is probably a reflection of the continuingly low labour demand in Sweden.

The analysis of hiring probabilities has also been stratified by education, age, gender, and marital status, in order to investigate possible interaction effects (see Table 3). It is among people with higher education and bad/fair health that the hiring probability is relatively high in Denmark (panel a). People with primary education and ill health, on the other hand, have a significantly lower hiring probability in Denmark. The latter result is found for Norway as well, but not for Sweden. It is somewhat surprising that people with bad/fair health and higher education quite often gain employment in Denmark, considering that the flexible employment protection regulation mostly applies to 'low-skill' workers (Jensen 2011). We return to this finding in the discussion.

Table 4. Employment prevalence in 2011, by bad/fair health (panel a) or LLSI (panel b) and country (%).

	Denmark		Norway		Sweden	
A. Bad/fair health	(1) Bad/fair health	(2) Good health	(1) Bad/fair health	(2) Good health	(1) Bad/fair health	(2) Good health
Employed	37.62***	65.00	44.97***	70.32	34.58***	65.03
N	864	2243	914	2810	859	3183
B. LLSI	(1) LLSI	(2) Good health	(1) LLSI	(2) Good health	(1) LLSI	(2) Good health
Employed	35.95***	61.73	37.75***	69.12	35.05***	63.14
N	523	2584	596	3128	659	3383

Notes: *t*-Test on the difference between people reporting ill health (Bad/fair health or LLSI) and good health.
Significance levels: ***.01; **.05; *.1 NS/(empty) ≥.1.

The age stratified analysis (panel b) show that, in Denmark, people of prime age (30–59) with bad/fair health are significantly more likely to gain employment than people with good health. People above the age of 60 with ill health are less likely to gain employment in both Denmark and Sweden, but not in Norway. Lastly, the results indicate that it is particularly among men (panel c) and the unmarried (panel d) where ill health is negatively related to hiring likelihood in Sweden.

The results thus far lead to the following preliminary conclusion: People with bad/fair health and higher education are hired to a relatively high extent in Denmark during the economic downturn. Those with bad/fair health and low education, on the other hand, are significantly less likely to gain employment in Denmark. People with health problems are hired to a comparatively low degree in Sweden in 2008–2011, perhaps a reflection of the continuingly low labour demand. People reporting bad/fair health have quite similar hiring probabilities as those with good health status in Norway, the only exception being among those with low education ($b = -0.018$, $SE = 0.008$). Next, we turn to a number of robustness checks, in order to see whether these results hold.

4.2. Robustness checks

All of the preceding regressions have also been calculated with a different health measure – limiting long-standing illness (LLSI) (Table A4 in the appendix). In several model specifications, the LLSI coefficient is negative and significant for Norway and Sweden, but this is never the case for Denmark. In these models – when the health measure is a more

Table 5. Temporary work contract in 2011, by bad/fair health (panel a) or LLSI (panel b) and country (%).

	Denmark		Norway		Sweden	
A. Bad/fair health	(1) Bad/fair health	(2) Good health	(1) Bad/fair health	(2) Good health	(1) Bad/fair health	(2) Good health
Temporary	7.02*	4.60	8.43	6.96	14.07*	10.22
N	299	1325	344	1826	263	1849
B. LLSI	(1) LLSI	(2) Good health	(1) LLSI	(2) Good health	(1) LLSI	(2) Good health
Temporary	10.00***	4.47	7.03	7.20	15.38**	10.19
N	170	1454	185	1985	208	1904

Notes: *t*-test on the difference between people reporting ill health (Bad/fair health or LLSI) and good health. The number of observations is quite low because only people reporting to be in employment in 2011 have answered the work contract question.
Significance levels: ***.01; **.05; *.1 NS/(empty) ≥.1.

'serious' one – the results indicate that Norway is the country where those with ill health fare the worst. The empirical pattern is therefore slightly different when the health measure is changed, but the main conclusion is the same: people with LLSI fare somewhat better in Denmark than in Norway and Sweden.

The differences in hiring probabilities between Denmark and Sweden (the reference group) are confirmed in a regression where all observations are pooled, and country dummies are interacted with bad/fair health or LLSI (see Table A5). The differences between Norway and Sweden are not statistically significant (for either health measure).

Lastly, the preferred model (Table 2, model 2) is run with logistic regression using both bad/fair health and LLSI, and the same pattern as before is evident (see Table A6). In summary, neither choice of health measure nor a linear model is responsible for the presented findings, and it seems as though people with ill health are more likely to be hired in Denmark than in Norway and Sweden. In the following – and last – analysis section, we investigate how firmly people with health problems are attached to the labour market in Scandinavia.

4.3. Employment rates and temporary work contract

Table 4 presents the percentage who report 'employment' as their economic status in 2011, stratified by bad/fair health (panel a) or LLSI (panel b). Here we can investigate potential cross-national differences in the overall employment rates, in order to see whether the 'flexicurity' model is able to integrate more people with ill health into the labour

market. The year 2011 is chosen because Denmark and Sweden experienced similar demand for labour.

Unsurprisingly, the employment rates are highest in Norway, and this holds for both people with good and ill health. It is, however, more rewarding to compare Sweden and Denmark. The employment rates are somewhat higher for those with bad/fair health in Denmark than in Sweden (37.62% vs. 34.58%), whereas the difference is almost non-existent for LLSI. The differences between Denmark and Sweden are not statistically significant (*t*-tests available on request). Although Sweden has experienced worse economic conditions than Denmark in the years preceding 2011 (see Figure A1), people with ill health report to be employed to a similar extent in these two countries.

Another important aspect is the use of temporary work contracts (Table 5). 2011 is chosen because it is the only year for which temporary work contract information is available for Denmark. The cross-national differences are striking. People reporting ill health (both health measures) in Norway have temporary work contracts to the same extent as those with good health. People with ill health in Sweden, on the other hand, are roughly 50% more likely to have temporary work, compared to people with good health. This holds for both bad/fair health and LLSI. The 'health penalty' is even more evident in the Danish sample. Approximately 4.5% of those with good health in Denmark have a temporary work contract. The corresponding share for those who report ill health are noticeably larger: 7% and 10% for bad/fair health and LLSI, respectively. The differences for Denmark and Sweden are statistically significant,[9] for both health measures.

In summary, labour market attachment remains rather 'loose' among Danish respondents with health problems, as indicated by the larger share holding a temporary work contract. There is a 'health component' in the use of temporary work in Sweden as well, although to a lesser extent. In Norway, however, people with ill health hold temporary work to the same degree as those reporting good health. Lastly, the employment rates in 2011 for those with ill health are very similar in Denmark and Sweden, despite Sweden having experienced considerably lower demand for labour in the preceding years.

[9]The differences between people with ill and good health are also significant in OLS regressions of temporary work, by bad/fair health or LLSI, with age, education, marital status, and gender included as covariates.

5. Discussion

5.1. Flexicurity, health, and labour market attachment

This paper has investigated three research questions, namely (i) whether people with ill health struggle to gain employment during the economic downturn in Scandinavia, (ii) whether the Danish 'flexicurity' labour market model is an advantage for people with ill health, and (iii) how firmly people with ill health are attached to the labour market. In general, people who report bad/fair health are not very disadvantaged in their *hiring probabilities* in either of the Scandinavian countries, but there are some signs of health being a negative feature in the Swedish context. When people with LLSI are considered, the likelihood of gaining employment seems somewhat worse than among people with good health in both Norway and Sweden. Overall, the results are most positive for the Danish sample, perhaps indicating that weak EPL makes employers more prone to 'take the risk' associated with hiring someone with bad health.

Nevertheless, one should be reluctant to conclude that the 'flexicurity' model is favourable for people with ill health, for four reasons. Firstly, it is only among those with bad/fair health and *higher educational qualifications* that the hiring probability is comparatively high. This is surprising given the fact that it is mostly among 'low-skill' workers that EPL is weak in Denmark (Jensen 2011). Hence, if weak EPL acts as an incentive in favour of hiring people with ill health, one should observe it among people with lower educational qualifications. Yet, the opposite empirical pattern is found: People with bad/fair health and primary education are significantly *less* likely to gain employment in Denmark. It is therefore doubtful that weak EPL is beneficial for people with a negative signal on the CV (e.g. ill health or unemployment 'scar'). Note that weak physical health status is more of an obstacle to perform manual labour, and selection effects are thus stronger in 'low-skill' labour market segments. Still, this does not explain the differences between Sweden (−0.003) and Denmark (−0.017) in hiring probabilities for individuals with ill health and low educational qualifications.

Secondly, the overall *employment rates* for people with ill health are similar in Denmark and Sweden, even though Sweden has experienced worse economic conditions. Theoretically, we would expect those with ill health to be more disadvantaged in Sweden. The combination of low labour demand and strong EPL means that 'cream-skimming' should be more widespread in Sweden, at least compared to Denmark. Yet, the

results do not correspond to this expectation, perhaps indicating that strong EPL is not very harmful after all.

Thirdly, the use of *temporary work contracts* is much more prevalent among people with ill health in Denmark. Here, people with LLSI are twice as likely to hold temporary work, compared with people reporting good health. The same pattern is present in Sweden as well, although to a lesser extent. Recall that temporary work contracts are more widespread in Sweden (Dølvik *et al.* 2015). This means that although the *relative* differences between people with good and ill health are greater in Denmark, the *absolute* number of people with ill health on temporary work contracts will be larger in Sweden. In Norway, the use of temporary work contract seems unrelated to health status. However, the current Norwegian government (elected in 2013) has decided to follow Sweden in making it easier for firms to hire temporarily (Dølvik *et al.* 2015), and the prevalence of temporary work contracts is thus expected to rise in the future. If so, people with health problems will likely be overrepresented in Norway as well, as their health status represents a risk from the employer's point of view.

Fourthly, because of cross-national differences in *mobility rates*. The comparatively high hiring probabilities for people with ill health and high education in Denmark are most likely a result of two important processes: First, a higher worker turnover rate overall in the Danish labour market (Madsen 2004; Andersen and Svarer 2007), and second, a high unemployment risk for people with ill health in Denmark during the recent economic downturn (Heggebø 2015). This means that people with health problems are in the 'pool' of potential candidates for a job opening to a large extent, and this could account for some of the cross-national differences in hiring likelihood.

How does the presented findings correspond to previous research on this topic? Reeves *et al.* (2014) found that stricter EPL was able to lower the firing likelihood for people with ill health in European countries experiencing less severe (or no) economic crisis. The current study shows that people with ill health are not particularly disadvantaged regarding hiring likelihood in Norway and Sweden, perhaps indicating that strong EPL is not necessarily harmful for 'vulnerable groups' on the labour market. Moreover, the positive results for people with ill health in Denmark are only visible among the higher educated. This is in line with McAllister *et al.* (2015), who show that the employment rates of people with low education and limiting long-standing illness was on a very low level in Denmark in 2000–2005, especially compared

to Sweden. Apparently, the 'flexicurity' model is unable to integrate people with ill health and low education into the labour market.

As a whole, people with ill health seem to fare rather well on the labour market in Scandinavia, but there are some challenges too. For Norway, people with LLSI are somewhat disadvantaged regarding hiring likelihood, but the use of temporary work contracts is apparently unrelated to health status. For Sweden, individuals reporting health problems (LLSI and bad/fair health) have a lower hiring probability, and there is a noticeable 'health component' in the use of temporary work contracts as well. Thus, the results overall are quite negative in Sweden, perhaps reflecting the continuingly low labour demand during the investigated time window. The hiring outcomes are more favourable for people with bad/fair health in Denmark, but only among the higher educated. Furthermore, labour market attachment remains rather loose for people with ill health, as indicated by (i) more temporary work contracts and (ii) a high unemployment risk during the current economic downturn.

In conclusion, the 'flexicurity' model might lead to more people getting 'a foot in the door', but the final test is whether people with a negative signal (e.g. ill health) get a safe and permanent job. Denmark does not seem to pass the test.

5.2. Strengths and limitations

This paper adds to the existing literature by investigating how institutional differences (EPL) are associated with employment prospects for people with health problems. An obvious strength of the current design is related to the similarity of the three Scandinavian countries, ensuring that cross-national heterogeneity is kept to a minimum. The EU-SILC data material is well suited for the present study because it includes health information, and because the data material is harmonised, which enables cross-country comparison of results.

Although the data material is harmonised, there are some potential pitfalls. It might be more legitimate to stay economically inactive for those with bad health in one of the countries, for instance. This seems rather implausible, however, since the Scandinavian countries share an emphasis on employment being an important mean for integration and social participation. In addition, public expenditure on active labour market policies is high in 2011 (1.93%, 0.56%, and 1.16% of GDP for Denmark, Norway, and Sweden, respectively), further strengthening the 'work first' approach. In fact, out of 30 OECD countries it was only the Scandinavian countries

along with Poland and Switzerland who spent more on active than on passive labour market measures (OECD 2015b).

The differential demand for labour in Scandinavia (and other time trends) is dealt with through calendar year dummy variables. Still, two other differences could have an impact on the results. First, people with ill health report 'disabled' as economic status to a lesser extent in Sweden (see Table A1), perhaps indicating that their health problems are less serious on average. If so, the results could be biased (i.e. labour market attachment seems worse than it actually is). This is, however, unlikely to be the case, considering that the Swedish bad/fair health sample is somewhat 'negatively selected' on observable characteristics (see Table A2). The reason why Swedes less often report being disabled is probably related to the stricter eligibility criteria[10] for disability benefits introduced in recent years (Hägglund 2013; Lidwall 2013). Second, unemployment benefits are more generous in Norway, perhaps giving people with ill health an incentive to stay unemployed. Yet, this seems unlikely according to the unemployment rate among people with LLSI in 2011: only 1.15% (women) and 3.21% (men) report unemployment as economic status (results available on request).

As mentioned above, people with ill health fare reasonably well overall on the Scandinavian labour market during the economic downturn. This means that other 'vulnerable groups' probably have experienced the main bulk of the disadvantages, such as immigrants and younger individuals. Remember that ill health correlates with old age, and older individuals are frequently protected by last-in-first-out seniority rules in Scandinavia (Lindbeck 1994; Von Below and Thoursie 2010). Thus, older individuals with health problems are rather unlikely to be dismissed, and will not have to apply for a new job. Recall, however, that people developing health problems tend to lose their jobs in Denmark (Heggebø 2015), indicating that seniority rules perhaps are insufficient when employment protection is weak.

Another challenge concerns the imprecise health measures used in this study. Unemployed and inactive people reporting ill health could be more/less healthy in one of the Scandinavian countries. Moreover, there might be cross-national differences in the degree of mismatch between educational qualifications and the job accepted by people with ill health (i.e. he/she might be forced to lower the 'reservation wage'). It is difficult to conclude on these issues, since we do not directly observe the hiring

[10]In other words, you probably have to be *very* sick in order to receive disability benefits in Sweden, at least compared to Denmark and Norway.

decision in EU-SILC. Future research – preferably using experimental data – should try to dissect the relationship between ill health and labour market attachment even further.

Since the data material is longitudinal, it would have been possible to specify individual level fixed effects models in order to come closer to identifying a causal relationship. Unfortunately, there is not enough statistical power to run these models (i.e. very few individuals both change health status and gain employment). More importantly, the main aim of this paper is not to establish a causal link, but rather to investigate labour market attachment for people with ill health in Scandinavia. Furthermore, the EU-SILC data material is not well suited for the testing of which explanatory mechanisms (see Section 2.1) that are important for the health–employment status relationship. Lastly, it is important to stress that the investigated time window was quite 'extreme', in the sense that overall demand for labour was quite low throughout Scandinavia. Hence, the results of this study cannot necessarily be generalised to more booming economic conditions.

Acknowledgements

Earlier versions of this manuscript were presented at the Norwegian Sociological Associations' annual meeting on 23 January 2015, at a workshop on economic crisis and population health in Oslo on 18 May 2015, and at an ESPAnet workshop on health impacts of social policy in Stockholm on 26 September 2015. I wish to thank Jon Ivar Elstad, Gunn Elisabeth Birkelund, Espen Dahl, Elisabeth Ugreninov, and the participants at these seminars for valuable suggestions. I would also like to thank the reviewers for excellent comments.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This paper is a part of the project 'Health Inequalities, Economic Crisis, and the Welfare State', financed by The Research Council of Norway [grant number 221037].

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Appendix

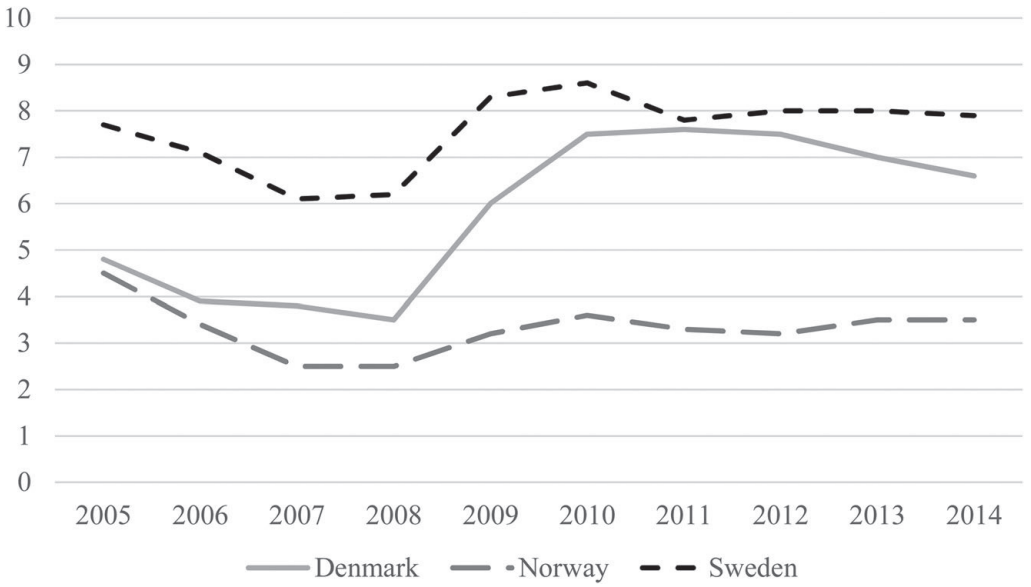

Figure A1. Unemployment rates in Denmark, Norway, and Sweden 2005–2014. Source: Eurostat.

Table A1. Disability prevalence in 2011 among men (1) and women (2) reporting bad/fair health (panel a) or LLSI (panel b), by country (%).

	Denmark		Norway		Sweden	
A. Bad/fair health	(1) Men	(2) Women	(1) Men	(2) Women	(1) Men	(2) Women
Disabled	8.99*	16.46	14.32†	21.31†	7.35	10.88‡
N	378	486	440	474	381	478
B. LLSI						
Disabled	16.16	22.15	21.29†	26.80†	10.04	13.25‡
N	198	325	249	347	259	400

Note: Results derived from *t*-tests (significance level: 95%).
*Significant difference between Denmark and Norway.
†Significant difference between Norway and Sweden.
‡Significant difference between Sweden and Denmark.

Table A2. Descriptive statistics among people with bad/fair health, by country (%).

	Denmark	Norway	Sweden
Hiring	2.33	2.03	1.65
LLSI	47.63	47.63	53.66
Educational level			
Primary education	33.15	29.22	30.84
Secondary educ.	41.68	47.48	50.40
Higher education	23.23	21.73	17.53
Age			
Young age (<30)	3.45	9.91	5.95
Prime age (30–59)	47.37	48.69	35.65
Old age (>60)	49.18	41.40	58.40
Woman	55.78	52.85	57.82
Married	59.61	47.51	49.33
N	2320	3391	2909

Table A3. Result from OLS and GLS regression of hiring, by bad health and gender.

	Denmark		Norway		Sweden	
	OLS	GLS	OLS	GLS	OLS	GLS
Constant	0.015***	0.015***	0.020***	0.020***	0.020***	0.020***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Bad/fair health	0.004	0.005	0.001	0.001	−0.008**	−0.008**
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Woman	−0.001	−0.000	0.005*	0.005*	0.010***	0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Woman × bad/ fair health	0.007	0.007	−0.008	−0.008	−0.001	−0.001
	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)
R^2	0.001	0.001	0.000	0.000	0.002	0.002
Individuals	3362		5892		5752	
Observations	9333		15,379		14,295	

Note: Reported standard errors (in parentheses) are clustered on individuals.
Significance level: ***.01; **.05; *.1 NS/(empty) ≥.1.

Table A4. Robustness check.

	Denmark	Norway	Sweden
Panel A. LLSI			
LLSI	0.007* (0.004)	−0.002 (0.003)	0.005 (0.003)
Panel B. Educational level (ref.: higher education)			
LLSI	0.006 (0.007)	−0.011** (0.006)	−0.018*** (0.006)
Primary education × LLSI	−0.008 (0.010)	−0.014* (0.008)	0.019** (0.007)
Secondary education × LLSI	0.003 (0.010)	0.014* (0.007)	0.021*** (0.008)
Panel C. Age (ref.: 30–59 years)			
LLSI	0.009 (0.007)	−0.002 (0.004)	0.010 (0.006)
Young age × LLSI	0.038 (0.033)	0.003 (0.019)	−0.011 (0.022)
Old age × LLSI	−0.008 (0.007)	0.001 (0.004)	−0.008 (0.007)
Panel D. Gender (ref.: men)			
LLSI	0.002 (0.006)	−0.002 (0.005)	−0.006 (0.004)
Woman × LLSI	0.006 (0.008)	−0.012** (0.006)	0.001 (0.006)
Panel E. Marital status (ref.: unmarried)			
LLSI	−0.001 (0.006)	−0.013*** (0.005)	−0.009** (0.005)
Married × LLSI	0.011 (0.008)	0.009 (0.006)	0.011* (0.006)
Individuals	3362	5897	5752
Observations	9333	15,384	14,205

Notes: Result from GLS regression of hiring, by LLSI and covariates (panel a), LLSI, education, and LLSI × educational level (panel b), LLSI, age, and LLSI × age (panel c), LLSI, gender, and LLSI × gender (panel d), or LLSI, marital status, and LLSI × marital status (panel e). Reported standard errors (in parentheses) are clustered on individuals. Only the health coefficient and the interaction terms (health × covariate) is presented. Full models available on request. Calendar year dummy variables included in regressions.
Significance level: ***.01; **.05; *.1 NS/(empty) ≥.1.

Table A5. Result from GLS regression of hiring, by bad/fair health (model 1) or LLSI (model 2), Denmark, Norway, Denmark × ill health, and Norway × ill health.

	(1) Bad/fair health	(2) LLSI
Constant (Sweden)	0.025*** (0.001)	0.024*** (0.001)
Ill health†	−0.009** (0.003)	−0.005 (0.003)
Denmark	−0.010*** (0.002)	−0.008*** (0.002)
Norway	−0.002 (0.002)	−0.001 (0.002)
Denmark × ill health	0.017*** (0.004)	0.011** (0.005)
Norway × ill health	0.006 (0.004)	−0.004 (0.004)
R^2	0.000	0.001
Individuals	15,011	15,011
Observations	38,922	38,922

Note: Reported standard errors (in parentheses) are clustered on individuals.
†Bad/fair health in model 1, LLSI in model 2.
Significance level: ***.01; **.05; *.1 NS/(empty) ≥.1.

Table A6. Robustness check.

	Denmark	Norway	Sweden
Panel A			
Bad/fair health	2.056***	1.341**	1.223
	(1.406–3.006)	(1.012–1.777)	(0.881–1.699)
Panel B			
LLSI	1.559**	0.892	1.273
	(1.002–2.424)	(0.606–1.314)	(0.910–1.782)
Individuals	3362	5892	5430
Observations	9333	15,379	12,318

Notes: Result from logistic regression of hiring, by bad/fair health (panel A) or LLSI (panel B), and covariates. Included covariates: woman, two age dummies, marital status, two educational dummies, and calendar year dummy variables. Only odds ratio for the ill health measures presented. Full models available on request. 95% confidence intervals reported in parentheses. Standard errors clustered on individuals.
Significance levels: ***.01; **.05; *.1 NS/(empty) ≥.1.

Paper 2

Kristian Heggebø: Unemployment in Scandinavia during an economic crisis: Cross-national differences in health selection. *Social Science & Medicine* (2015), 130: 115-124.

Social Science & Medicine 130 (2015) 115–124

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

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

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ARTICLE INFO

Article history:
Available online 13 February 2015

Keywords:
Scandinavia
Health selection
Unemployment
Labor market demand
Employment protection
Fixed effects

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.

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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http://dx.doi.org/10.1016/j.socscimed.2015.02.010
0277-9536/

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,

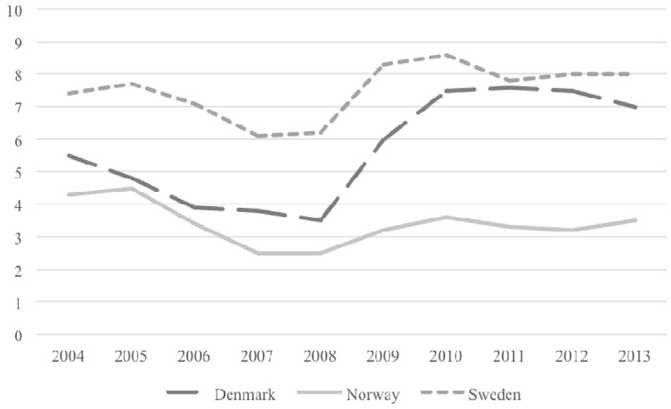

Fig. 1. Unemployment rates 2004–2013, by country.
Source: Eurostat.

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.

Acknowledgments

This paper is a part of the project "Health Inequalities, Economic Crisis, and the Welfare State" – financed by The Research Council of Norway (grant number: 221037). I would like to thank Jon Ivar Elstad, Gunn Elisabeth Birkelund, Espen Dahl and Truls Tømmerås for valuable comments on an earlier draft. I also wish to thank the three anonymous reviewers for their contribution.

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.

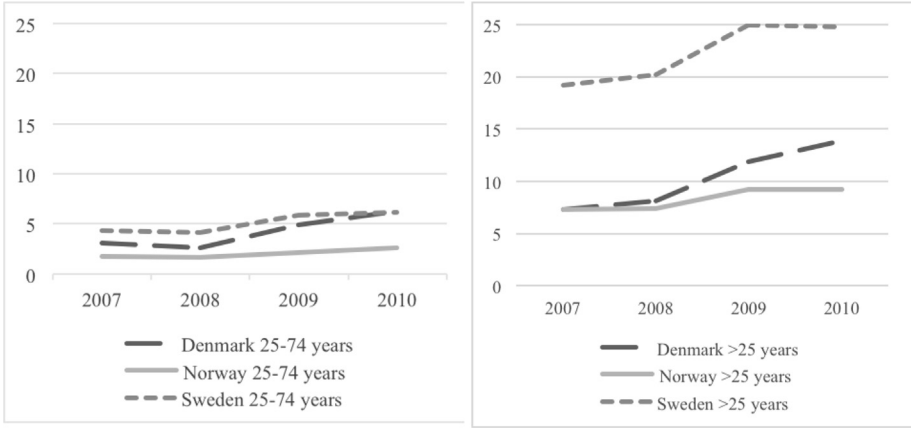

Figure A1. Unemployment rates 2007–2010 by country, for older (left) and younger (right) workers (Source: Eurostat).

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Paper 3

Kristian Heggebø: Health effects of unemployment in Denmark, Norway and Sweden 2007-2010: Differing economic conditions, differing results? *International Journal of Health Services* (2016), 46(3): 406-429.

International Journal of Health Services
2016, Vol. 46(3) 406–429

DOI: 10.1177/0020731416636365
joh.sagepub.com
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Health Effects of Unemployment in Denmark, Norway and Sweden 2007–2010: Differing Economic Conditions, Differing Results?

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Abstract

This article investigates short-term health effects of unemployment for individuals in Denmark, Norway, and Sweden during an economic downturn (2007–2010) that hit the Scandinavian countries with diverging strength. The longitudinal part of the European Union Statistics on Income and Living Conditions (EU-SILC) data material is analyzed, and results from generalized least squares estimation indicate that Denmark is the only Scandinavian country in which health status deteriorated among the unemployed. The individual-level (and calendar year) fixed-effect results confirm the negative relationship between unemployment and health status in Denmark. This result is robust across different subsamples, model specifications, and changes in both the dependent and independent variable. Health status deteriorated especially among women and people in prime working age (30–59 years). There is, however, only scant evidence of short-term health effects among the recently unemployed in Norway and Sweden. The empirical findings are discussed in light of: (1) the adequacy of the unemployment insurance system, (2) the likelihood of re-employment for the displaced worker, and (3) selection patterns into and out of employment in the years preceding and during the economic downturn.

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Keywords
unemployment, ill health, health effects, labor market demand, economic downturn, Scandinavia, fixed effects

A large number of people have recently experienced unemployment because of the ongoing economic downturn in Europe. For the 28 E.U. member countries as a whole, the unemployment rate increased from 7% in the start of 2008 to 11% in 2013.[1] In December 2014, approximately 24 million people were registered as unemployed in the EU-28. Becoming unemployed usually implies an income loss,[2] and it might also lead to human capital devaluation. Furthermore, the unemployment period leaves a "scar" on a person's résumé, and the chances of re-employment could therefore be substantially lowered.[3,4] To lose one's job could also be coupled with feelings of inferiority and shame.[5] Unemployment is clearly an undesirable event, but does it make you sick? The current study will investigate the *health effects of unemployment* in order to answer this question.

Previous research on health status and unemployment has yielded mixed results: some find negative health effects of unemployment[6] and others do not.[7] This discrepancy is likely related to characteristics of the samples included in these studies and/or the identification strategy (as discussed below), and there is no consensus on the topic. Further inspection is therefore warranted.

To investigate health effects of unemployment, this study will use the longitudinal part of the European Union Statistics on Income and Living Conditions (EU-SILC) data material, in which there is individual information on labor market attachment and health. EU-SILC is a four-year rotary panel; hence we can only investigate *short-term* health effects of unemployment. This article will therefore provide a first glance of the potential health effects, leaving the long-term health consequences of the current economic downturn for future research. The observational period is 2007 to 2010, so that we can follow individuals both before and during the economic downturn. The following analysis consists of generalized least squares (GLS) estimation and individual-level (and calendar year) fixed-effects models (FE), where all time-invariant personal characteristics are controlled for.

The research context is set to Scandinavia: Denmark, Norway, and Sweden. The Scandinavian countries share many similarities (e.g., high tax levels and high public spending on social welfare) and are often placed within the same Welfare State Regime.[8] However, there are vital differences between these countries that could have an impact on the health effects of unemployment. First, the *generousness of the unemployment benefit plans* show some variation among the countries, with Norway being the most generous and Sweden the least generous.

Second, the *re-employment chances* for laid-off workers are not equally good throughout Scandinavia, where the "tight" Norwegian labor market is a clear contrast to the neighboring countries. Third, the countries have experienced differing overall demand for labor in recent years, which means that *selection patterns* into and out of employment have been quite dissimilar.

The current study asks two main research questions: (1) Are there any signs of short-term health effects of unemployment during the ongoing economic downturn in Scandinavia? If so, (2) in which of the Scandinavian countries are the short-term health effects of unemployment most pronounced? This article therefore contributes to the existing literature on two important domains. First, it investigates short-term health effects of unemployment during an *economic downturn*, which hit the Scandinavian countries with diverging strength. The negative health impact of unemployment could quite possibly be sensitive to changing economic conditions. Second, it uses an *explicit comparative design*. The harmonized data material allows an examination of whether or not health effects of unemployment are related to diverging labor market characteristics in Scandinavia.

Theory and Previous Research

Potential Explanatory Mechanisms

To properly explain the relationship between unemployment and subsequent health deterioration, we need to introduce mechanisms that are theoretically capable of generating the observed statistical association.[9] Why should a period of unemployment cause someone's health to deteriorate? The unemployment experience acts as a stressor, and it might cause elevated "allostatic loads" among those who lose their job. Allostatic load refers to the cumulative price the body pays for repeated exposure to challenging psychosocial situations, and this bodily "wear and tear" may leave unemployed individuals more vulnerable to disease.[10,11] Correspondingly, Maier and colleagues[12] find a significant increase in cortisol levels among long-term unemployed people, indicating that the stress surrounding unemployment episodes can be harmful for physical health. In addition, substantial aspects of the negative effects of unemployment will likely be due to deteriorating mental health.[13,14] Not going to work could be damaging for a person's mental health because of a lack of the *latent functions* of employment.[15–17] Apart from income, employment provides activity, time structure, social contacts, collective purpose, and social status for the individual. Without these functions in everyday life, a person's psychological well-being could be expected to deteriorate.

There might also be *positive* aspects of unemployment. Not going to work could imply less stress (physical and/or psychological) and more time to exercise. And with less money to spend, the unemployed might drink less alcohol and

smoke fewer cigarettes. For instance, health behaviors changed during the 2008 crisis in Iceland, with less consumption of both unhealthy (smoking, heavy drinking, sweets, and fast food) and healthy (fruits and vegetables) products, probably due to *increased prices*.[46] People smoke more and drink less during economic upturns in the United States, but they also exercise less, a finding that could be related to how *time-consuming* these goods are.[47] Hence, individuals' health behavior could change during an unemployment period, but it is not a given whether the changes will amount to negative or positive health consequences. Moreover, whether unemployment status is considerably worse than employment depends on the quality of the job.[18] If the job previously held was insecure and involved health-damaging work conditions, the health status could actually improve during unemployment. Although being unemployed could have positive features in the short term, there are good reasons to suspect that prolonged unemployment, and the accompanying insecurity, are undesirable. Life satisfaction tends to be lower among the unemployed,[19,20] likely as a result of the stress that surrounds unemployment status.

But what exactly is so stressful about the unemployment experience? Previous research has highlighted two important domains of stress: financial hardship and social stigma.[21,22] *Financial hardships* can potentially have serious consequences and might be mediated through stress related to bills, inability to pay for nutritious meals or medical expenditures, etc. *Social stigma* associated with unemployment could also affect health. Being made redundant may be coupled with feelings of inferiority, failure, and shame, feelings with potentially adverse health impacts.

It should be noted that the EU-SILC data material is not well-suited for the search for explanatory mechanisms, but potential differences between the Scandinavian countries in the health effects of unemployment might nonetheless shed some light on the issue. For instance, if the health effects are most pronounced in the country with least generous unemployment benefits, this could indicate that financial hardship is an important mediating mechanism.

Unemployment and Health Status: Previous Research

Unemployment and ill health are clearly correlated, but this does not necessarily imply that the former *causes* the latter. It may be that people with ill health are selected to unemployment to a higher extent. Alternatively, the relationship could be caused by important omitted variables that are correlated with health and unemployment. Unemployed individuals will likely be a negatively selected group on a number of characteristics, on both observable (e.g., educational level, health) and unobservable features (e.g., personality, cognitive ability).

This selection into unemployment is extremely difficult to account for in statistical estimations, unless we can identify a "natural experiment" in which the layoff decision is not influenced by this unobservable heterogeneity.

Accordingly, there seems to be a divergence in the existing literature that stems from whether the study investigates so-called *exogenous* unemployment, or whether *endogenous* unemployment is also included. Displacements due to plant closures are an example of the former, whereas an ordinary firing is an example of the latter.

The identification problem most often stems from the available datasets, because it is impossible to create a laboratory experiment in which the variables of interest (unemployment and health) are randomly assigned to treatment and control groups. Additionally, there has been a lack of longitudinal data in the past. To overcome the possible selection problems in their cross-sectional American data, Kessler, House, and Turner[23] generated a subsample of unemployed people who were not at fault for their job loss. These unemployed people had significantly worse status for a number of health measures, including physical illness, anxiety, and depression. Similarly, a British study deals with the potential problem of reversed causality through unemployment measures that predate onset of symptoms.[6] The authors find that unemployment is a significant risk for depression and anxiety resulting in medical consultation. Furthermore, analysis of data from 13 European countries shows that unemployment has a negative impact on the length of time spent in good health.[24] Moreover, a number of studies have established a statistical association between unemployment and mortality.[25–27] However, it should be mentioned that Lundin and colleagues[28] find few statistically significant associations between unemployment (>90 days) and cause-specific mortality in their Swedish sample.

Research that investigates all types of unemployment seems to agree that the experience is associated with a subsequent deterioration in health. The picture is somewhat different when only *exogenous* unemployment is considered. Analysis of American data indicates no significant health effects of job loss due to business closures.[29] Similarly, analysis of the German Socio-Economic Panel does not find evidence of negative health effects among individuals experiencing job loss due to plant closures.[7] Furthermore, a Danish study finds no effect of displacement due to plant closures/downsizing on stress-related diseases of the circulatory or digestive systems.[30] Last, unemployment does not seem to worsen self-assessed health in Finland either, a result derived from panel data with difference-in-difference estimation and propensity score matching techniques.[31]

The present study is located between these two broad research strategies, because the sample consists of unemployment of all kinds, whereas the longitudinal data allows control of time-invariant personal characteristics. Even though the unemployment experience can be considered to be "more random" during a recession, we do not know in which cases the dismissals are truly exogenous. Moreover, even during an economic downturn, there will most certainly be a selection into unemployment on a number of personal features (including health profile), because employers wish to keep the most productive employees. This is worrying from a causal inference perspective, because this

(health) selection could bias the results. To deal with these difficulties, the longitudinal part of the EU-SILC data material is utilized. With individual-level fixed-effect models, the effect of a *change* in unemployment status on a subsequent *change* in health status can be estimated. This way, all time-invariant personal characteristics are controlled for, and we can be more convinced that the estimated association between unemployment and health status is not a spurious one. Hence, our first research question is: "Are there short-term health effects of unemployment during the ongoing economic downturn in Scandinavia?"

Cross-national Differences: Unemployment Benefits and Labor Market Demand

The Scandinavian countries share a whole range of characteristics, and they are classified within the social democratic Welfare State Regime.[8] Denmark, Norway, and Sweden all have high tax levels, free or heavily subsidized education, a universal health care system, and an emphasis on egalitarian values. These similarities are an advantage from a methodological point of view, because the respondents live in countries that are organized quite similarly. This ensures, furthermore, that there likely will not be important cross-national differences in response bias.

Nevertheless, there are some cross-national differences that could have an impact on the health effects of unemployment. Financial security is crucial for both physical and mental well-being, and generous *unemployment benefits* could prove to be an important "tool" in the combating of health problems during unemployment.[32,33] Sweden has recently (2007–2008) altered its unemployment regulations, and considerably fewer people are eligible for benefits now.[34] Denmark and Norway, on the other hand, are still quite generous in their unemployment benefit plans. Accordingly, the replacement rate shows some divergence between the three countries: a short-term unemployed single person without children, on average wage, would in 2012 be compensated 65% in Norway, 57% in Denmark, and 45% in Sweden.[35]

Another noticeable dissimilarity between the Scandinavian countries concerns overall *demand for labor*. The unemployment rates from 2004 to 2013 are shown in Figure 1.

Denmark and Norway had a similar trend in the years preceding the downturn, with a low unemployment rate and a slight reduction over time. From 2008 and onward, there was a rapid increase in unemployment in Denmark, whereas the unemployment rate remained low in Norway (2.5–3.5%). Sweden has experienced a high unemployment rate in the entire period (never below 6%) and a clear rise in the first part of the economic downturn (2009–2010).

The dissimilar overall demand for labor in Scandinavia could have an impact on the following analysis for two reasons. First, the *re-employment*

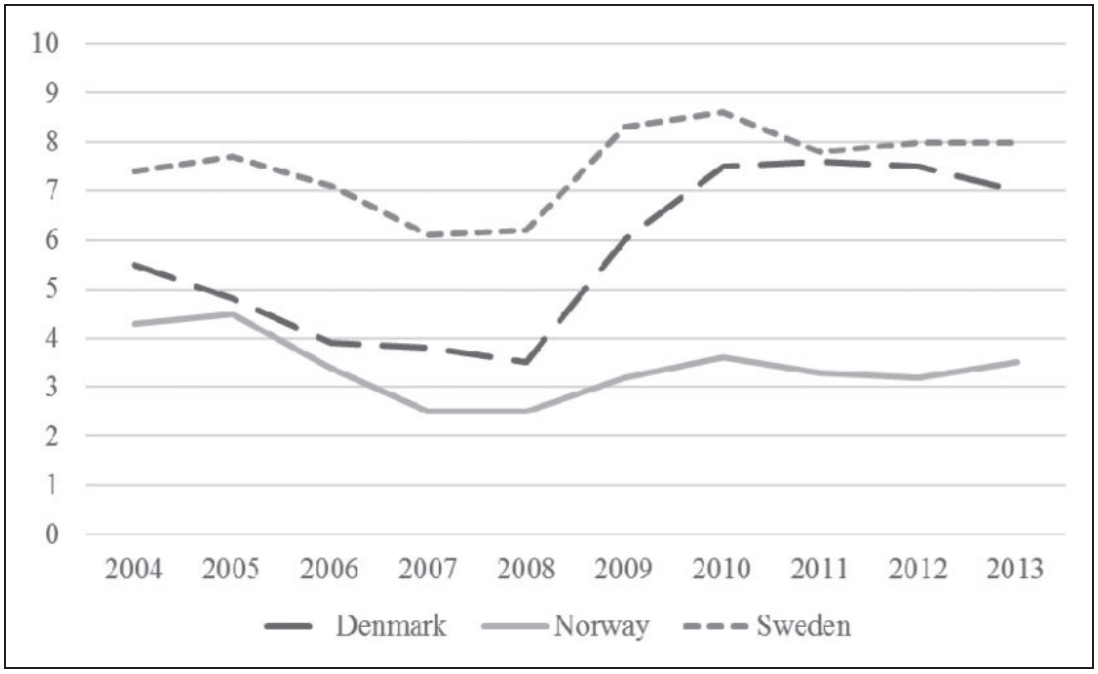

Figure 1. Unemployment rates 2004–2013, by country. *Source:* Eurostat.

chances for the unemployed—which could moderate the negative impact of an unemployment period[19,20]—are different in the three Scandinavian countries. Both Denmark and Sweden are experiencing low demand for labor, and there are few opportunities for individuals wishing to regain employment. Chances for re-employment are substantially better in Norway. Second, there is *differential selection* into and out of employment. Because of continuingly low demand for labor in Sweden, those inside the labor force pre-2007 could be positively selected on health characteristics and thus be less inclined to deteriorate in health if they lose their jobs. The composition of the employment population is different in Norway and Denmark, in which labor demand was high until 2008. People with ill health (or vulnerable health profiles) likely joined the labor force to a significant extent before the economic downturn, ensuring that those who lose their jobs during the downturn could be negatively selected on health characteristics.

The cross-national differences are summarized in Table 1.

The unemployed in Sweden should be worse off if unemployment benefits are crucial, whereas health effects are expected to be noticeable in both Denmark and Sweden if re-employment chances are important. Last, the health consequences would be greatest in Denmark and Norway if a negatively selected unemployment population is driving the results. Consequently, the second research question of the present study is: "In which of the Scandinavian countries are the negative short-term health effects of unemployment most pronounced?"

Table 1. Cross-National Differences: In Which Country can we Expect the Health Effects of Unemployment to be Most Pronounced?

	Ungenerous unemployment benefits	Slim re-employment chances	Negatively selected unemployed population
Denmark		X	X
Sweden	X	X	
Norway			X

Data and Method

Data

The longitudinal part of the EU-SILC data material is used in the present study. EU-SILC is an annual survey that provides micro data on a variety of variables, including health status and unemployment. The EU-SILC has a panel structure, and surveys from the years 2007–2010 were chosen for this analysis. By using this time window, we can follow the same individuals from before the start of the economic downturn until its "peak" (see Figure 1 above).

EU-SILC is a rotary panel, in which individuals are followed for a maximum of four years. This means we can only investigate short-term health effects of unemployment, and the more long-term health impact of the economic downturn is therefore left for future research. The EU-SILC data material is harmonized for comparative purposes and therefore well-suited for the current study. Table 2 presents the participation rates. The Norwegian sample is the most balanced one, with almost half of the respondents answering the survey questions four times.

Operationalization

The dependent variable in the following analysis 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 both of these questions, he or she is coded 1. It would obviously be preferable to have a more objective measure, but the reliability of self-reported health measures seems to be satisfactory.[36] LLSI could be considered as a "slow" variable that is unlikely to change in the short run because of a job loss. However, the present article aims to investigate whether unemployment *deteriorates* health, not whether the health status is lowered somewhat. A different health measure—*self-rated health*—will nonetheless be used to check the robustness of the results. This is a

Table 2. Longitudinal Survey Participation Rates, by Country (Number and Percent).

	Denmark		Norway		Sweden	
	N	%	N	%	N	%
1	558	2.98	3,274	11.30	2,558	8.80
2	5,312	28.39	6,138	21.18	8,032	27.63
3	6,372	34.06	5,196	17.93	9,021	31.03
4	6,468	34.57	14,368	49.59	9,464	32.55
Total	18,710		28,976		29,075	

continuous measure (values 0–4), with people asked to rate their health from very good to very bad. The higher the value, the worse health status in general.

The *unemployment* 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 or she is coded 1. A potential problem with the current unemployment 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.[37] This is probably less of a challenge in Scandinavia, where active labor market policies require that the unemployed search for work to receive benefits. Another potential problem is that people who are currently working could, in theory, answer "yes" on both of the abovementioned questions. Hence, a different unemployment measure, *self-defined economic status*, will be used as a sensitivity test. Those who state being currently unemployed are coded 1 (else = 0).

A number of covariates will also be included in the following analysis. Obviously, we could envision a whole range of confounding variables that should be included in the regressions. However, because individual-level fixed-effects analysis controls for all time-invariant factors, it is only important to include variables that potentially *change* during the investigated time window.

There is an educational gradient in health, with highly educated people tending to have better health than those with less education.[38] Educational level consists of two dummy variables computed from a question on highest education attained. Pre-primary, primary, and lower secondary are collapsed to *primary education*, and (upper) secondary and post-secondary non-tertiary are collapsed to *secondary education*. Higher educational qualifications (*tertiary education*) is thus the reference category. People's health tends to deteriorate in old age, and we therefore need to examine the impact of age. Age is coded as two dummy variables: *Old age* (= >60 years) and *young age* (= <30 years). Age 30–59 is the reference category. The continuous variables *age* and *age squared* are used in some model specifications.

Table 3. Descriptive Statistics, By Country and Gender.

	Denmark		Norway		Sweden	
	Men	Women	Men	Women	Men	Women
Ill health (LLSI)	6.3	9.1	6.1	8.8	6.4	10.2
Unemployment	2.8	2.6	1.6	1.6	3.6	3.5
Education						
Primary	27.0	28.5	24.9	24.9	23.4	20.5
Secondary	44.3	37.5	43.2	39.1	52.7	47.2
Tertiary	27.1	32.5	28.8	32.4	22.5	31.1
Income in € (*Std. Dev.*)	32,672.45 *(32,800.29)*	24,733.74 *(22,862.52)*	35,643.21 *(41,023.00)*	21,974.77 *(22,314.64)*	20,167.25 *(22,440.85)*	14,323.91 *(15,622.53)*
Age						
<30	16.0	14.2	21.2	20.5	22.4	20.3
30–59	52.6	56.9	54.8	56.2	48.3	50.4
>60	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	9,496	9,853	15,728	15,647	15,351	15,407

People who get married could be different on a number of unobserved individual characteristics, and models without a marriage variable could hence be miss-specified. Those who report to be *married* are coded 1 (else = 0). The continuous variables *income* and *income squared* will be included in the FE models, because people who experience a drop in income could be inclined to deteriorate in health afterward. The analysis will also be stratified by gender, as women tend to report more health troubles than men.[39]

Descriptive Statistics

Descriptive statistics by gender and country are presented in Table 3. Women report more LLSI than men in all three countries, a difference that exists within each of the three age categories (results not shown). The Scandinavian countries are strikingly similar in the amount of LLSI reported: 6.3, 6.1, and 6.4% for male respondents. 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.

The educational level is fairly equally distributed among the three countries, although Sweden is somewhat dissimilar, with relatively few respondents with primary education (men and women) 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" is largest in Sweden, where 31.1% of women and 22.5% of men have tertiary education.

Average gross yearly income is higher in Denmark and Norway than in Sweden, and there are noticeable gender differences within each country (the largest are in Norway). Respondents from Denmark are married to a higher extent than their Norwegian and Swedish counterparts, and the mean age of the respondents is lowest in Norway, followed by Sweden and Denmark. Mean age is low in Norway because of a relatively low number of respondents of age 60 and above. In contrast, the Danish sample is comparatively old because of fewer respondents below the age of 30. The gender differences in age and marital status are small.

Analysis

The present ill health measure is a dichotomous variable, and it could therefore be tempting to use logistic regression, but there are a number of pitfalls to be aware of.[40,41] Because the variance is assumed to be fixed in a logistic distribution, the size of the parameter estimate is affected not only by the included covariates, but also by the degree of unobserved heterogeneity in the model specification. In addition, it is not straightforward to compare estimates derived from logistic regression for different samples. A solution to these challenges is to use linear probability models. Ordinary least squares (OLS) will yield biased standard errors when estimated on repeated observations, and generalized least squares (GLS) models are thus preferable. The first part of the following analysis consists of GLS models, where ill health is regressed on unemployment and a number of covariates. The results could indicate whether certain groups —such as women or people with less education—are more prone to ill health or to health effects of unemployment.

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.[42] This assumption is unlikely to be fulfilled in nonexperimental settings. However, if we specify an individual-level *fixed-effects* (FE) model on longitudinal data, all unobserved time-invariant personal characteristics are automatically controlled for.[43,44] The FE analysis is performed on a subsample that excludes people who had ill health and/or were unemployed in 2007, before the economy took a turn for the worse. The basic idea is to calculate the effect of a *change* in unemployment status on a *change* in health, and the intention is to establish whether there exists a (causal) link. The following equation will be estimated:

$$(1)\ Ill\ health_{it} = Unemployed_{it1}\beta_1 + Year_{it2}\beta_2 + \nu_i + \varepsilon_{it}$$

where $_i$ represents the individual, and $_t$ represents time. β_1 is the parameter of interest, namely the effect of a change in unemployment on the probability of ill

health. v represents all unobserved factors that vary across individuals but are constant over time, and ε represents all unobserved time-varying characteristics. Calendar year dummy variables (β_2) will capture potential underlying time-trends in the unemployment experience. Additional time-variant covariates (marital status, educational level, age, and income) will be included in some model specifications, yielding the following equation:

$$(2)\ Ill\ health_{it} = Unemployed_{it1}\beta_1 + Year_{it2}\beta_2 + Married_{it3}\beta_3 + Education_{it4}\beta_4 + Age_{it5}\beta_5 + Income_{it6}\beta_6 + v_i + \varepsilon_{it}$$

Unobserved heterogeneity is still an issue of concern, because we have no way of controlling for other factors that have changed during the observational period that could cause people who lose their jobs to deteriorate in health. In addition, there is some concern that the causal direction flows from ill health to unemployment, something that could have been investigated with a *lagged* unemployment variable. This was, however, not possible because the panel is unbalanced. As a sensitivity test, we restrict the outcome measure (LLSI) to the years 2009–2010 and 2010 only. These models will help us rule out the danger of reverse causality, because it is unlikely that ill health in 2009 and/or 2010 can cause unemployment during the investigated time window.

Results

Table 4 presents results from GLS regression of ill health by unemployment both without (Model 1) and with (Model 2) a number of covariates. Starting with Model 1, Denmark is the only country in which there seem to be health effects of unemployment. Surprisingly, people who experience unemployment actually have *better* health than those who do not in Sweden. This unexpected result for Sweden is no longer present after adjustments for gender, age, marital status, and educational level (Model 2). The reference categories in this model are unmarried men of prime age (30–59 years) with tertiary education who have not experienced unemployment. The positive coefficient remains statistically significant for Denmark. Hence, the GLS analysis indicates there is an association between unemployment and ill health in Denmark, whereas this is not the case in Norway or Sweden.

The included covariates show the expected direction in almost all cases, the only major exception being that people with secondary educational level in Denmark do not have statistically significant worse health than their tertiary-educated counterparts. Young people have better health, whereas older people have worse. Women report more health problems than men do, and the married have better health on average. The point estimates are quite similar throughout

Table 4. Result from GLS Regression of Ill Health, by Unemployment and Covariates.

	Denmark		Norway		Sweden	
	(1)	(2)	(1)	(2)	(1)	(2)
Constant	0.074*** (0.002)	0.095*** (0.007)	0.071*** (0.002)	0.056*** (0.005)	0.081*** (0.002)	0.061*** (0.005)
Unemployment	0.035*** (0.011)	0.041*** (0.011)	0.004 (0.010)	0.013 (0.010)	−0.017** (0.007)	−0.003 (0.007)
Woman		0.024*** (0.005)		0.025*** (0.004)		0.037*** (0.004)
Young age		−0.099*** (0.008)		−0.070*** (0.005)		−0.066*** (0.005)
Old age		0.037*** (0.006)		0.058*** (0.005)		0.080*** (0.005)
Married		−0.059*** (0.006)		−0.040*** (0.004)		−0.044*** (0.004)
Primary education		0.025*** (0.007)		0.050*** (0.005)		0.028*** (0.006)
Secondary education		0.007 (0.006)		0.037*** (0.004)		0.018*** (0.005)
R^2	0.001	0.028	0.000	0.034	0.001	0.040
Individuals	7,118		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 labor market, reflecting the similarity of the three investigated countries.

Further examination using GLS models indicates some heterogeneity regarding which groups of people are more susceptible to health effects of unemployment in Scandinavia (results not shown). For instance, unemployed women are less likely than men to experience health deterioration, but only significantly so in Sweden. Furthermore, young individuals are less likely to decline in health status, but only in Denmark. People of old age are less likely to experience health deterioration after unemployment in both Denmark and Norway, whereas the coefficient is not significant for the Swedish sample. Hence, it is important to investigate whether the health effects of unemployment are *heterogeneous* in the following fixed-effects models. Health status might deteriorate only among certain subgroups of the samples.

The evidence presented thus far indicates that the health status of the unemployed deteriorated in Denmark, but not in Norway or Sweden. However, GLS estimation does not deal properly with unobserved individual characteristics that might bias the results. Now, focus is switched to FE models, and the question is whether a change in unemployment status is related to a change in health status. Table 5 present results from individual-level (and calendar year) FE models. Model 1 does not include any additional covariates, and Model 2 includes age, age squared, educational level, income, income squared, and marital status. The analysis confirms that health deteriorated among the recently unemployed in Denmark, whereas the same relationship is not observed in Norway or Sweden. The inclusion of additional covariates (Model 2) does not alter the results.

To rule out reverse causality, the outcome measure has been restricted to only consider ill health in 2009 and/or 2010 (results available on request). Basically, the same results are derived from these models, with the exception that the coefficient for Denmark is no longer statistically significant when we restrict the outcome to the year 2010 ($b = 0.020$, $SE = 0.015$), possibly because the health effects are *heterogeneous*. We therefore need to consider the sensitivity of the results more carefully, and a number of different model specifications is shown in Table 6.

The results presented earlier could be biased because the panel is unbalanced. Model 1 shows estimates from a panel where the individuals have participated 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. Denmark is still the only country where there is a noticeable health deterioration, and the point estimate is somewhat higher in this model specification.

The analysis performed separately for women and men is found in Models 3 and 4, respectively. It is apparently among Danish women that the health effects of unemployment are most pronounced. Additionally, there is some evidence of health deterioration among Swedish men, although the coefficient is quite small.

Table 5. Results from Fixed-Effects (FE) Analysis of Ill Health (2008–2010), by Unemployment and Covariates.

	Denmark		Norway		Sweden	
	(1)	(2)	(1)	(2)	(1)	(2)
Unemployment	0.030* (0.016)	0.031* (0.016)	0.008 (0.013)	0.006 (0.013)	0.001 (0.008)	0.002 (0.008)
Covariates (in addition to individual-level and calendar year fixed effects)	None	Age, education, income, marital status	None	Age, education, income, marital status	None	Age, education, income, marital status
R^2	0.007	0.008	0.010	0.012	0.005	0.006
Individuals/ Observations	6,955/ 18,710	6,955/ 18,710	11,667/ 28,976	11,664/ 28,966	11,947/ 29,075	11,875/ 28,999
Person/years	546/1,585	546/1,585	437/1,400	437/1,399	735/2,147	735/2,147
Hausman test[a]	−32.96	−118.64	−53.50	−254.38	−104.29	−207.35
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, whereas *person/years* is the number of observations contributing to the FE estimates.
[a]The Hausman test compares the reported FE models with GLS models.

Table 6. Results from Fixed-Effects (FE) Analysis of Ill Health (2008–2010) by Unemployment 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
Unemployment	0.040* (0.020)	0.066** (0.028)	−0.001 (0.014)	−0.009 (0.024)	0.006 (0.011)	−0.013 (0.017)
Individuals/ Observations	3,741/12,840	3,836/10,277	5,324/19,559	6,534/16,198	5,373/18,485	5,947/14,453
Person/years	367/1,227	267/759	312/1,149	203/633	495/1,667	259/747
	(3) Subgroup: women	(4) Subgroup: men	(3) Subgroup: women	(4) Subgroup: men	(3) Subgroup: women	(4) Subgroup: men
Unemployment	0.048** (0.023)	0.017 (0.023)	−0.020 (0.018)	0.029 (0.019)	−0.014 (0.013)	0.018* (0.011)
Individuals/ Observations	3,506/9,434	3,449/9,276	5,780/1,4290	5,884/14,676	5,890/14,368	5,985/14,631
Person/years	300/869	246/716	239/779	198/620	414/1,214	321/933
	(5) Health measure II	(6) Unemployed II	(5) Health measure II	(6) Unemployed II	(5) Health measure II	(6) Unemployed II
Unemployment	0.121* (0.068)	0.052** (0.018)	0.026 (0.062)	0.025* (0.015)	−0.047 (0.045)	0.007 (0.010)
Individuals/ Observations	3,167/9,070	6,955/18,710	5,012/13,743	11,664/28,966	5,402/14,069	11,875/28,999
Person/years	771/2,342	546/1,585	815/2,739	437/1,399	893/2,717	735/2,147
Significance level	*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1					
Covariates:	Calendar year dummies, marital status dummy, educational level dummies, income, income squared, age, and age squared.					

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

Table 7. Results from Fixed-Effects (FE) Analysis of Ill Health 2010, by Unemployment and Covariates Among (a) Prime Age Individuals, (b) Women, and (c) Prime Age Women.

	Denmark		Norway		Sweden	
	(1)	(2)	(1)	(2)	(1)	(2)
(a) Prime age Unemployment	0.061**	0.060**	−0.029	−0.030	−0.011	−0.012
	(0.028)	(0.028)	(0.022)	(0.022)	(0.013)	(0.013)
Person/years	216/ 577	216/ 577	149/ 435	148/ 433	215/ 580	215/ 580
(b) Women						
Unemployment	0.057**	0.061**	−0.003	−0.003	−0.023**	−0.018*
	(0.028)	(0.028)	(0.018)	(0.018)	(0.009)	(0.009)
Person/years	246/ 667	246/ 667	171/ 512	170/ 510	317/ 876	317/ 876
(c) Prime age women						
Unemployment	0.124**	0.124**	−0.060*	−0.060*	−0.040**	−0.039**
	(0.050)	(0.049)	(0.032)	(0.032)	(0.019)	(0.019)
Person/years	139/ 371	139/ 371	87/ 257	86/ 255	143/ 386	143/ 386
Covariates (in addition to individual-level and calendar year fixed effects)	None	Age, education, income, marital status	None	Age, education, income, marital status	None	Age, education, income, marital status
Significance level	*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1					

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

The coefficient is actually bigger for men in the Norwegian sample, but not statistically significant. The health variable has been changed to *self-assessed health status* in Model 5. This is a continuous measure, ranging from 0 to 4, where 4 equals very bad general health. The results remain basically unaltered, and the coefficient for Denmark is quite large (b = 0.121, SE = 0.068). The unemployment coefficient is actually negative for Sweden, but not significant. Model 6 presents results from a model in which the unemployment measure has been changed. It is now based on a question regarding respondents' self-defined *current economic status*. Again, the results for Denmark remain robust. The coefficient is also positive and significant for the Norwegian sample, but not for Sweden.

The results from the sensitivity testing indicated that it is among women and people of prime working age that the health effects of unemployment are most pronounced in Denmark, and this is investigated more thoroughly in Table 7. Here we restrict the ill health measure to the year 2010 to be more certain about the causal direction. The results are confirmed for both prime age workers (Panel A) and women (Panel B). The health effects of unemployment are particularly marked among women of prime working age in Denmark (Panel C), where the effect size is doubled (from 0,060 to 0,124). The Norwegian and Swedish women of prime age, however, tend to significantly *improve* their health status in the aftermath of an unemployment experience.

In summary, the analysis indicates there is a negative short-term health effect of unemployment in Denmark, especially among women and people of prime working age. There is some evidence of health effects among Swedish men as well, although of a noticeably smaller effect size. The unemployed seem to be quite "healthy" in Norway, where the unemployment coefficient was positive and significant in only one model specification. Before these results are discussed in greater detail, some limitations must be noted.

Limitations

The measures included in this study are *self-reported* and might therefore be prone to measurement error. People could overstate their amount of health problems in an effort to rationalize the fact that they are currently unemployed, leading to upwardly biased estimates. Problems stemming from *cultural differences* in how ill health and unemployment are reported are probably negligible, because Table 3 shows that the Scandinavian countries are astonishingly similar in the amount of ill health being reported. It should also be stressed that this article is only able to investigate the *short-term* health effects of unemployment, due to the four-year rotary panel structure of the EU-SILC data material.

The most important limitation of the conducted study, however, concerns the *identification strategy*. The use of FE models does only eliminate the threat from time-invariant personal characteristics, and things that have changed during the

investigated time window could still bias the estimates. In addition, this study has examined unemployment of all kinds, including endogenous. It would have been better from a causal inference perspective to only investigate exogenous unemployment—layoffs due to plant closures, for instance. This was, however, not possible with the present data material. Furthermore, due to a rather low number of unemployment observations and an unbalanced panel, it was not possible to include a lagged unemployment measure in the statistical models. By restricting the outcome measure to only consider ill health in the years 2009 and/or 2010, the possibility of reverse causality (i.e., people with ill health are selected to unemployment) are diminished, but not flawlessly so. With these caveats, we move on to the discussion.

Discussion

The results show that Denmark is the only Scandinavian country in which there are noticeable short-term health effects of unemployment. These effects are heterogeneous in the sense that they are most pronounced among women and people of prime working age (30–59 years), especially among 30- to 59-year-old women. The picture is completely different for Norway and Sweden, where unemployed 30- to 59-year-old women tend to significantly *improve* their health status. This is an odd result, to which we return below. There is some evidence of health deterioration among Swedish men as well, although of a much smaller effect size. Overall, the unemployed seem to be quite "healthy" in Norway, where the unemployment coefficient is positive and significant in only one model specification.

The evidence from this study thus indicates that the health consequences of unemployment are considerably worse in Denmark, compared with Norway and Sweden. Why is this so? The answer is probably not related to the adequacy of the *unemployment insurance system*, because the Danish system is more generous than the Swedish. It should also be noted that Swedish labor unions seem to "buffer" against income losses during unemployment periods.[45] The differences between Sweden and the neighboring countries are therefore probably not as marked as the replacement rates would indicate, because the unions play a bigger part in the Swedish institutional arrangement. Hence, all three Scandinavian countries appear to be able to protect the unemployed against financial hardships. Moreover, controlling for (changes in) income did not alter the results to any substantial extent, providing more support for this interpretation.

This does, however, not imply that the financial situation is trivial for the health and well-being of the unemployed—quite the contrary. Previous research has indicated that the health status of the unemployed is more vulnerable when they are not sufficiently protected by unemployment benefits.[32,33] Furthermore, the current study has only investigated short-term health effects, and prolonged

unemployment, with accompanying financial hardship, will most likely be health-damaging. It should also be kept in mind that health care is free of charge or heavily subsidized throughout Scandinavia, and the (low) costs involved are similar regardless of labor market attachment. Hence, unemployed people with declining health status do not need to sacrifice a visit to the doctor to provide food on the table, to put it bluntly. The linkages between unemployment, health, and income could therefore be more pronounced outside the Scandinavian context.

The likelihood of *re-employment* for the displaced worker[19,20] is another potential explanation for the observed cross-national difference. The Norwegian labor market is quite "tight," and chances for re-employment rather good. The trivial health consequences of unemployment in Norway could therefore be explained by good prospects for re-employment, ensuring that the unemployed stay in good spirits. What is more puzzling, however, is the difference between Denmark and Sweden. The demand for labor is low in both countries, and the probability of re-employment equally so. One could argue that the Swedish labor market has been characterized by a continuingly high overall unemployment rate the preceding years and that the Swedes are "accustomed" to this situation. Denmark, on the other hand, went from a situation of high to low demand for labor in merely two years' time. This critical worsening of the economic situation is likely to affect people's perception of their chances on the labor market and might even influence their health status.

That the Danish respondents' health should be so severely affected by worsening economic conditions is rather doubtful. A more promising explanation is linked to differential *selection patterns* into and out of employment in the years preceding and during the economic downturn. There was high demand for labor until 2008 in Denmark, and people with ill health probably joined the labor force to a high extent. After 2008 there was a massive rise in unemployment, and people with ill health and/or vulnerable health profiles were probably among the first to exit from employment. Sweden, on the other hand, has had low demand for labor for a number of years, and individuals with vulnerable health profiles have therefore been a part of the labor force to a much lesser extent. Those who became unemployed during the downturn are hence positively selected on health characteristics, at least compared with Danish respondents.

But how does this interpretation fit with the results for Norway? People who lose their job in Norway—where labor demand has been continuingly high—are probably a more selected group on a number of personal characteristics, including health status. Hypothetically, this would imply *stronger* health effects in Norway, because those who become unemployed are expected to have a more vulnerable health profile. But because of the favorable economic context in Norway, there are quite simply too few layoffs for there to be a systematic

selection out of employment among those with vulnerable health. Moreover, because the re-employment chances are good and the unemployment benefits generous, the stress associated with unemployment is probably less pronounced in Norway. Furthermore, differential selection patterns could, in fact, explain the rather weird finding that unemployed 30- to 59-year-old women tend to improve their health status in both Norway and Sweden. Being unemployed for a (short) while is not health-damaging for these women simply because they are positively selected on health characteristics.

To focus on unemployment of all kinds is clearly troublesome from a causal inference perspective, but at the same time highly desirable from a policy point of view. It is, in the end, the health effects of *all* unemployment that a welfare state must deal with economically. The results presented here indicate that Denmark might be facing considerable costs in the aftermath of the recession, with rising medical expenses and more sickness absence. This might not be the case, however, if the health status of the unemployed improves again when the demand for labor rises and re-employment can be ensured. Furthermore, there is still uncertainty regarding the long-term health consequences of the economic downturn in Scandinavia, and this is something that warrants further investigation.

What are the main policy implications of this article? Overall, the results tend to be quite positive, with rather few signs of short-term health declines among the recently unemployed in Scandinavia. To ensure the unemployed stay fit and healthy, two elements need to be in place: first, sufficient economic support to prevent financial hardships, and second, free or subsidized health care, so that (potential) health problems can be dealt with early on. It should, however, be stressed that we do not know to what extent these factors are able to prevent health effects of unemployment, but it is likely that they play an important part.

This study was not able to localize which mechanisms are generating the relationship between unemployment and (declining) health. Future research should emphasize this theoretical puzzle, as a better understanding of the mechanisms that are causing health to deteriorate after an unemployment spell will make it easier to recommend policy solutions.

Acknowledgments

This paper is a part of the research project "Health Inequalities, Economic Crisis, and the Welfare State". I would like to thank Jon Ivar Elstad, Gunn Elisabeth Birkelund, Espen Dahl, and Anne Grete Tøge for valuable comments on earlier drafts. All remaining errors are my own.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: the Research Council of Norway (Grant No. 221037).

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Paper 4

Kristian Heggebø and Espen Dahl: Unemployment and health selection in diverging economic conditions: Compositional changes? Evidence from 28 European countries. *International Journal for Equity in Health* (2015), 14: 121.

Heggebø and Dahl *International Journal for Equity in Health* (2015) 14:121
DOI 10.1186/s12939-015-0258-8

INTERNATIONAL JOURNAL FOR EQUITY IN HEALTH

RESEARCH Open Access

Unemployment and health selection in diverging economic conditions: Compositional changes? Evidence from 28 European countries

Kristian Heggebø* and Espen Dahl

Abstract

Unemployment and health selection in diverging economic conditions: Compositional changes? Evidence from 28 european countries.

Introduction: People with ill health tend to be overrepresented among the unemployment population. The relationship between health and unemployment might, however, be sensitive to the overall economic condition. Specifically, the health composition of the unemployment population could change dramatically when the economy takes a turn for the worse.

Methods: Using EU-SILC cross sectional data from 2007 (pre-crisis) and 2011 (during crisis) and linear regression models, this paper investigates the relationship between health and unemployment probabilities under differing economic conditions in 28 European countries. The countries are classified according to (i) the level of and (ii) increase in unemployment rate (i.e. >10 percent and doubling of unemployment rate = crisis country).

Results: Firstly, the unemployment likelihood for people with ill health is remarkably stable over time in Europe: the coefficients are very similar in pre-crisis and crisis years. Secondly, people with ill health have experienced unemployment to a lesser extent than those with good health status in the crisis year (when we pool the data and compare 2007 and 2011), but only in the countries with a high and rising unemployment rate.

Conclusion: The health composition of the unemployment population changes significantly for the better, but only in those European countries that have been severely hit by the current economic crisis.

Keywords: Unemployment, Health selection, Economic crisis, Europe

Introduction

Europe is currently struggling with a deep and long-lasting economic downturn, commonly referred to as "the Great Recession". The probably most important consequence of the recession has been the large increase in unemployment rates. In the 28 EU member countries as a whole, the unemployment rate increased from 6.8 percent in the start of 2008 to 11.0 percent in 2013 [1]. When the economy takes a turn for the worse – and overall unemployment rates increase rapidly – *the composition of the unemployment population* will supposedly change. In this situation, employers will have to fire healthy and productive employees that would otherwise have kept their jobs, and this will probably lead to a kind of "positive selection" into unemployment. For instance, people with higher educational levels could end up losing their jobs to a similar extent as those holding lower education. Likewise, people with good health status could experience unemployment to a similar (or even higher) degree, compared to people with ill health. The relationship between health status and unemployment in changing economic conditions is the topic of the current study, and we ask the following research question: *Do people with ill health experience unemployment to a*

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lesser extent than those with good health during the economic downturn in Europe?

That there is a statistical relationship between ill health and heightened unemployment likelihood is a well-established empirical fact, and this is due to both selective processes [2–4] and that health status deteriorates while being unemployed [5–7]. Furthermore, there is some evidence that the association between ill health and employment status could be sensitive to the overall economic condition of a country: it seems as though people with ill health struggle to re-enter the labor market in post-recessionary periods [8–10]. What is currently lacking in the existing literature on health and unemployment, however, is a clearer comparative focus, as much of the previous research on this topic has analyzed data from only one country. The current paper will try to fill this gap by investigating the unemployment likelihood for people with ill health in 28 European countries during diverging economic circumstances.

The cross-sectional part of the European Union Statistics on Income and Living Conditions (EU-SILC) data material is utilized, and linear regression models (OLS) are run. 2007 and 2011 are set as pre-crisis and crisis years respectively, and we investigate whether the relationship between ill health and unemployment probability is modified by a sudden change in the economic conditions. We add an explicit *cross-national* perspective to the research design by classifying countries according to the severity of the economic crisis: Countries in which the unemployment rate is above 10 percent in 2011, and where there was a doubling of the unemployment rate from 2007 to 2011 are classified as 'crisis countries'. The remaining countries are classified according to the percentage change in the unemployment rate, and we differentiate between 'mild crisis' (2.6-5 % increase), 'small increase' (1–2.5 % increase) and 'no crisis' (<1 % increase).

Previous research and crisis classification

Health and employment status

The current study will investigate whether people with ill health are more likely to be unemployed (commonly referred to as *health selection*), and to what degree the economic condition can alter this relationship. Previous studies have shown that people with ill health have a higher unemployment probability than people with good health [2–4]. Furthermore, there seems to exist a robust statistical association between health problems and a lower likelihood of having or gaining employment [11–13].

People who become unemployed could even deteriorate in health due to the stress pertaining to this adverse experience [14, 15]. Yet the empirical evidence is rather mixed on the negative causal effect of unemployment on health, where some find evidence of such a relationship [5–7], and others do not [16–19]. The relationship between health and employment status is probably of a reciprocal kind, where both health selection and health effects of unemployment is at work simultaneously [20–22].

In summary, a large body of research suggests a strong (reciprocal) relationship between ill health and employment status. Due to both selective processes and health effects of unemployment, the unemployed tends to be in worse health than the employed. Since the unemployment "penalty" for people with ill health is well established empirically, closer attention should be devoted to how the relationship *varies over time and space*. It might be the case, for instance, that certain circumstances are able to modify the negative association between health and unemployment. Consistent with this argument, a recent study finds cross-national differences in unemployment probabilities for people with ill health in Scandinavia, where health selection is most apparent in Denmark [23]. The current paper will investigate the time dimension, with an emphasis on the role of *changing economic conditions*.

Health selection in changing economic conditions

The relationship between health and employment status in changing economic conditions has been investigated to some extent previously, although most often using data from only one country. A British study found that people with ill health struggled to re-enter the labour market in the aftermath of economic downturns in 1973–93 [8]. A replication of this paper using a longer observational period (1973–2009) revealed similar findings [9]. Comparable patterns have been observed in Norway as well, where people reporting ill health had comparatively low employment rates after the recession in the late 1980s/ early 90s [10].

The three above-mentioned studies all investigate whether people with ill health continue to be disadvantaged *after* economic downturns. We ask a different research question: is the relationship between health and unemployment probability noticeably different *during* an economic crisis? In a similar vein, Åhs & Westerling [24] found that the differences in self-rated health between the employed and unemployed were greater when Sweden experienced high unemployment levels (in the 1990s), compared with a more "booming" economic condition. We follow the same path, but add an explicit *cross-national component* using data for 28 European countries. In addition, we investigate unemployment likelihood for people with health problems during the ongoing "Great Recession", where the included countries differ quite extensively concerning how severe the impact of

the crisis has been, as measured by national unemployment rates.

Country classification: severity of crisis

In the following, economic conditions are investigated along a time dimension, through the comparison of unemployment probabilities for people with ill health in a crisis and a pre-crisis year. Additionally, we use cross-national differences in the overall *severity of the crisis* to localize countries in which there was (i) no crisis at all, (ii) a small increase in the unemployment rate, (iii) a mild crisis, and (iv) a full-blown crisis.

Our reasoning is that in order for the "newly" unemployed to influence the composition of the unemployment population, two criteria must be fulfilled for the crisis to be counted as severe. First, unemployment during times of crisis must be a "mass phenomenon", and, second, a high amount of people must recently have lost their job. Thus, we take into account both the overall unemployment *rate* and how rapidly it *increased*. Our operationalization of severe crisis goes like this: nations in which the unemployment rate was (i) over 10 percent in 2011, and (ii) where the unemployment rate doubled from 2007 to 2011 are defined as 'crisis countries'. We admit that this classification is somewhat arbitrary, but we think it is reasonable. Countries with a continuingly high unemployment rate (but no increase) will not help us much, since we are interested in the effects of changing economic conditions. Neither are noticeable upward changes from a very low level (e.g. from 2 to 7 percent) likely to alter the unemployment population much, since being unemployed is still a rather rare event.

The years 2007 and 2011 are set as *pre-crisis* and *crisis year* respectively (more on the reasons for this choice below). Because our main interest is the potential change in the composition of the unemployment population, *overall national unemployment rate* is the most relevant crisis indicator. A crisis measure based on GDP is in this case not preferred because the unemployment rate tends to lag behind GDP changes [25]. This implies that a country could experience "jobless growth", where the economy is improving, while the unemployment rate stays high [26], leading to a misclassification of the country.

Table 1 provides official unemployment statistics from Eurostat in 2007 and 2011. As mentioned above, countries in which the unemployment rate is (i) over 10 percent in 2011 and (ii) where the unemployment rate doubled from 2007 to 2011 are classified as 'crisis' (e.g. Estonia: from 4.6 to 12.3 percent). The remaining countries are classified according to the percentage change in the unemployment rate. Countries who experienced between 2.6 and 5 percent increase are classified as 'mild crisis' (e.g. Hungary: from 7.4 to 11.0 percent), whereas an increase between 1.0 and 2.5 percent are classified as a 'small increase' (e.g. the Czech Republic: from 5.3 to 6.7 percent). Countries in which there was below 1 percent increase – or even a reduction – in the unemployment rate are classified as 'no crisis' (e.g. Belgium: from 7.5 to 7.2 percent).

Table 1 Overall unemployment rate 2007 and 2011 in 28 European countries. Source: Eurostat

Country	Pre-crisis: 2007	Crisis: 2011
Crisis		
Estonia	4.6	12.3
Greece	8.4	17.9
Ireland	4.7	14.7
Latvia	6.1	16.2
Lithuania	4.3	15.4
Spain	8.2	21.4
Mild crisis		
Bulgaria	6.9	11.3
Cyprus	3.9	7.9
Denmark	3.8	7.6
Hungary	7.4	11.0
Iceland	2.3	7.1
Portugal	9.2	12.9
Slovenia	4.9	8.2
United Kingdom	5.3	8.1
Small increase		
Czech Republic	5.3	6.7
France	8.0	9.2
Italy	6.1	8.4
Slovakia	11.2	13.7
Sweden	6.1	7.8
No crisis		
Austria	4.9	4.6
Belgium	7.5	7.2
Finland	6.9	7.8
Germany	8.5	5.8
Luxembourg	4.2	4.8
Netherlands	4.2	5.0
Norway	2.5	3.3
Poland	9.6	9.7
Romania	6.4	7.2

Classification
Crisis = Doubling of overall unemployment rate and > 10 percent
Mild crisis = 2.6-5.0 percent increase
Small increase = 1.0-2.5 percent increase
No crisis = < 1.0 percent increase
2007 EU-SILC- data not available for Croatia, Malta and Switzerland

Estonia, Greece, Ireland, Latvia, Lithuania and Spain fulfills the two criteria stated above, and therefore represents the *crisis* countries. These six countries also stand out regarding percentage changes in the unemployment rate, varying from 7.7 in Estonia to 13.2 in Spain. There is a *mild crisis* in Bulgaria, Cyprus, Denmark, Hungary, Iceland, Portugal, Slovenia, and the U.K., and a *small increase* in the unemployment rate is evident in the Czech Republic, France, Italy, Slovakia and Sweden. Lastly, there is *no crisis* (and even decreasing unemployment) in Austria, Belgium, Finland, Germany, Luxembourg, the Netherlands, Norway, Poland and Romania. This implies that – according to our classification – there is a crisis or a mild crisis in 14 of the 28 included European countries. In the remaining half, there is only a small increase in the unemployment rate, and in three cases (Austria, Belgium and Germany) even reductions.

Figure 1 shows the unemployment rate for Ireland, Portugal, Sweden and Poland (one country from each category), from 2005 and ten years onwards. The countries are chosen because they are "typical" for the country classification in the sense that they are in the middle range regarding change in unemployment rate from 2007 to 2011. The figure clearly shows the diverging unemployment trends for the four categories. Ireland represents the 'crisis' group, where there is a rapid increase in overall unemployment rate from 2007 and onwards. There is increasing unemployment in Portugal as well, but the line is clearly much less steep for this 'mild crisis' country. Also visible in Fig. 1, is the 'small increase' in Sweden from 2008 and onwards.

The trend for Poland – the included 'no crisis' country – shows us the downside of using only two cross-sections. When comparing 2007 and 2011, it appears that there has not been any changes in Polish labor demand at all: the unemployment rate is 9.6 and 9.7 percent respectively. Unfortunately, this hides the fact that the unemployment rate continued to decline in Poland, and from 2008 to 2010 there was actually a noticeable increase in the unemployment rate (from 7.1 to 9.7 percent). However, this is not an important problem for our purpose because we are mainly interested in what kind of "crisis case" the countries represent. In the following, we will investigate the unemployment risk for people with ill health in differing economic conditions, and try to see whether there are some patterns according to the severity of the crisis. We should nevertheless keep in mind that the current empirical strategy will only provide two "snapshots", and some intra-country nuances will therefore be lost.

Method and data

Data material

The cross-sectional part of the European Union Statistics on Income and Living Conditions (EU-SILC) data material is used in this paper. EU-SILC is an annual survey that covers all EU member countries, and Norway and Iceland. EU-SILC provides information on a wide range of variables, including health, employment status and basic demographics. Furthermore, the data material is harmonized cross-nationally for comparative purposes, and is therefore very well suited for our objective.

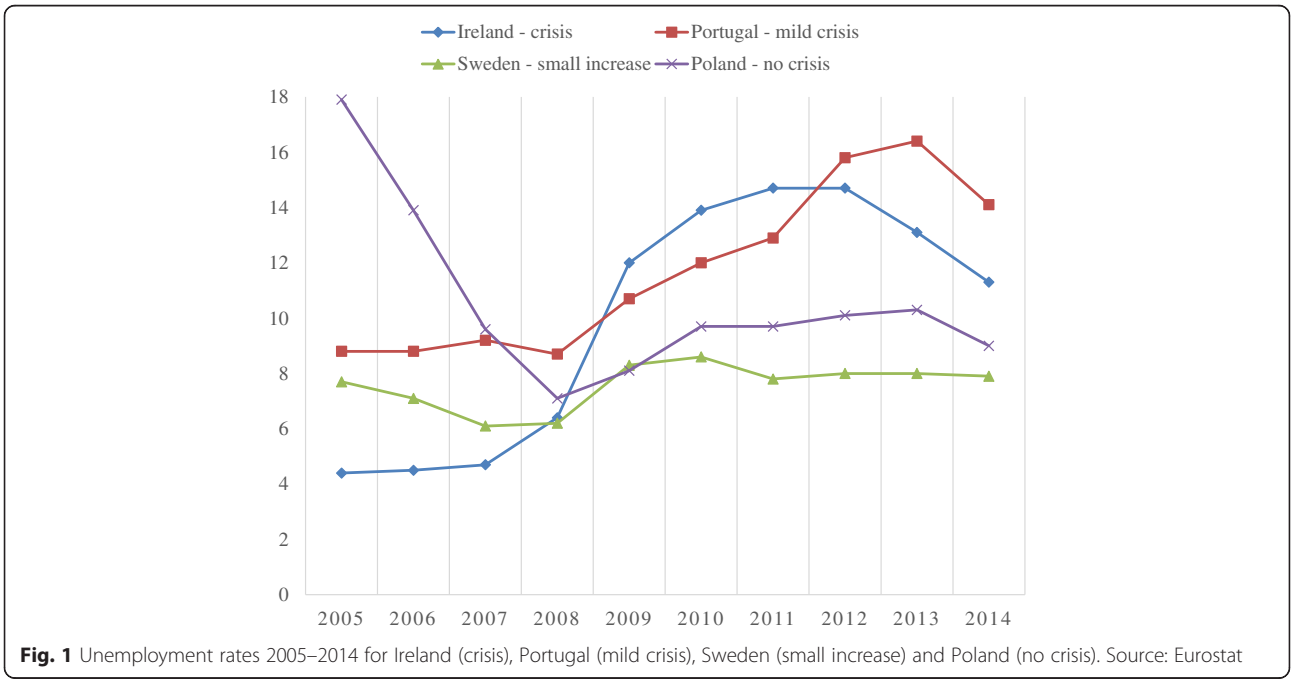

Fig. 1 Unemployment rates 2005–2014 for Ireland (crisis), Portugal (mild crisis), Sweden (small increase) and Poland (no crisis). Source: Eurostat

The EU-SILC consist of one cross-sectional and one longitudinal part, and the data are collected simultaneously. This means that (some of) the same individuals are included in both data sets, although it is only possible to localize these individuals in the panel. The EU-SILC panel is in a rotary format, where people are followed for a maximum of four years. In order for the same individuals not to contribute with several observations and hence biasing the results, we need a four-year gap between the pre-crisis and the crisis year. 2007 is chosen as *pre-crisis year* because the unemployment rate in Europe started to rise in 2008 (Eurostat 2015). Four years ahead – 2011 – is thus our *crisis year*. An alternative to using two (non-overlapping) cross-sections is to use the panel data (e.g. from 2008 to 2011), where it is possible to adjust for the fact that some people are contributing with several observations. However, to use the panel information is far from ideal because of attrition, which makes the samples less representative.

In the following, cross-sectional data from the years 2007 (pre-crisis) and 2011 (crisis) will be investigated in order to see whether the relationship between health and unemployment changes when the economy takes a turn for the worse. EU-SILC data is not available for the year 2007 for Croatia, Malta and Switzerland, and the total number of countries included in this study is therefore 28. There is no age restriction in the samples, but we include age dummies to adjust for possible cross-national differences in age composition.

Operationalization

Respondents who state to be unemployed on a question regarding their current economic status are coded 1 (else = 0) on the dummy variable *unemployment*. As a sensitivity test, the dependent variable is changed more in accordance with the International Labor Organizations' (ILO) definition in all regressions. The dummy variable *ILO unemployment* consists of answers to two questions: "Actively looking for a job in the previous four weeks?" and "Available for work in the next two weeks?" Respondents answering yes on both is coded 1, otherwise 0. Individual-level unemployment is an outcome measure that is affected by a whole range of (unobserved) variables, both on the individual (e.g. educational credentials), regional (e.g. local labor market demand) and national (e.g. active labor market policies) level. Hence, the unemployment experience will most likely vary considerably across Europe due to differences in existing labor market institutions and/ or political solutions to economic downturns (austerity measures, for instance). Because of this cross-national unobserved heterogeneity, we have chosen to run all of the following analyses split by country.

Limiting longstanding illness (LLSI) is the most important independent variable in this paper. It is computed from answers to two questions: whether the respondent suffers from a chronic longstanding illness, and whether the respondent is limited in activities people usually do because of this. Those answering yes on both questions are coded 1 (else = 0). LLSI is preferred because it does not fluctuate as extensively cross-nationally as the self-rated general health (SRH) measure does. LLSI is hence more suitable from a comparative perspective. Nevertheless, all of the regressions have been performed with SRH as well, in order to check the robustness of the results. People reporting to have fair, bad, or very bad health is coded 1 (good or very good health = 0) on the *bad/fair health* dummy variable. Those with fair health are included because the number of people reporting bad or very bad health is low for some countries (e.g. approximately 5 percent in Sweden), yielding problems with statistical power.

A number of covariates is also included. Educational level consists of two dummy variables computed from a question on highest education attained. Pre-primary, primary and lower secondary is collapsed into *primary education*, while (upper) secondary and post-secondary non-tertiary is collapsed into *secondary education*. Higher educational qualifications is thus the reference category. Age is derived from questions on birth year and survey year, and thereafter recoded into five dummy variables: 16–25, 26–35, 46–55, 56–65, and above 65 years. Age 36–45 is the reference category. Married individuals could possibly be different on a range of unobserved characteristics, and a dummy denoting 1 for *married* (else = 0) corrects for this. Lastly, it is a well-known fact that women tend to report more ill health than men do [27]. A dichotomous variable for *women* (0 = men) is included in the regressions to adjust for this tendency.

Descriptive statistics

The number of observations for each of the 28 included countries in both survey years is presented in Table 7 in the appendix. The sample size fluctuates from 2869 in Iceland to 43666 in Italy. This implies that the models will be estimated with more precision for some of the countries, but all samples should be representative for the national population in question.

Table 2 presents descriptive statistics for the main dependent (*unemployment*) and independent (*LLSI*) variable, along with the proportions who report having *higher education* and being *woman*, split by survey year. Full descriptive statistics are not shown in order to save space, but are available on request. For all six 'crisis countries', there is roughly a doubling of the unemployment experience being reported from 2007 to 2011. The

Table 2 Descriptive statistics on selected variables, by survey year (percentage)

	Unemployment		LLSI		Higher education		Woman	
	2007	2011	2007	2011	2007	2011	2007	2011
Crisis								
Estonia	3.08	7.48	32.79	33.70	20.09	26.17	53.93	58.74
Greece	5.01	11.53	17.39	22.27	15.66	17.12	51.95	52.04
Ireland	3.68	10.26	21.00	17.67	21.92	31.95	52.80	52.51
Latvia	4.42	11.76	31.17	32.87	16.64	20.90	57.67	57.40
Lithuania	3.83	8.56	26.46	24.35	20.58	23.68	54.25	56.93
Spain	6.18	11.96	16.66	18.55	20.96	23.09	52.40	52.27
Mild crisis								
Bulgaria	14.76	10.28	4.66	18.27	14.71	18.25	52.54	52.95
Cyprus	2.53	5.11	20.00	22.94	22.17	24.18	52.34	52.97
Denmark	2.30	3.57	15.13	16.50	26.63	30.74	51.54	52.01
Hungary	4.84	7.64	30.69	25.69	15.23	16.93	54.81	54.94
Iceland	0.84	4.36	12.30	17.27	21.47	24.59	49.29	51.68
Portugal	5.47	7.70	29.38	29.40	8.72	10.04	53.13	53.36
Slovenia	6.31	7.86	19.53	29.15	16.43	20.16	53.62	53.71
U.K.	1.71	3.09	22.43	23.32	22.35	31.47	53.68	52.67
Small increase								
Czech Republic	3.71	4.26	20.84	24.32	10.53	13.52	54.74	57.81
France	5.23	5.42	18.23	21.02	22.57	25.53	52.33	52.27
Italy	4.88	7.04	15.72	21.19	10.06	12.42	52.26	52.29
Slovakia	5.47	6.29	19.28	26.91	14.91	18.12	53.65	53.75
Sweden	2.73	3.87	19.08	16.16	27.32	29.82	51.32	52.36
No crisis								
Austria	3.22	3.86	18.85	23.16	15.65	17.50	52.72	52.71
Belgium	6.28	6.19	17.05	18.27	29.75	32.55	51.59	51.68
Finland	5.13	5.96	23.79	25.89	31.17	32.67	51.76	49.62
Germany	5.56	4.36	23.04	24.78	35.05	34.22	53.02	51.95
Luxembourg	4.22	3.87	11.92	11.52	25.48	22.42	50.18	50.58
Netherlands	1.07	1.74	17.18	21.83	30.26	33.16	54.39	54.25
Norway	1.68	1.82	18.30	16.53	29.10	36.50	48.84	46.90
Poland	7.71	6.51	21.70	22.32	12.21	15.53	53.60	53.93
Romania	3.30	2.45	17.26	24.64	9.19	10.89	52.45	52.29

Notes
Descriptive statistics only shown for the dependent variable (*unemployment*) and the independent variable of main interest (*LLSI*), along with two selected covariates (*higher education* and *woman*)
Full descriptive statistics are available on request

unemployment descriptives fit the country classification for the 'minor crisis' group as well, where there is a noticeable increase from 2007 to 2011. The 'small increase' group also corresponds well with the classification, with the possible exception of France, where there is almost no change (from 5.23 to 5.42), and Italy, where there is a noticeable increase (from 4.88 to 7.04). Lastly, there is not much change in the 'no crisis' group, and the most striking change is for the *better* (e.g. from 7.71 to 6.51 in Poland).

The overall level of unemployment is considerably lower for some of the countries compared with the official Eurostat statistics, indicating that the samples – in a number of cases – probably are positively selected (i.e. the most vulnerable groups are not reached). This is something worth remembering while interpreting the results.

The amount of LLSI being reported varies from approximately 12 (Luxembourg) to 33 percent (Estonia), although some of this difference is related to the age composition of the different samples. Mean age fluctuates from 43.54 (Luxembourg, in 2007) to 52.68 (Czech Republic, in 2011), and age dummies is therefore included in the following regressions. It should be mentioned, however, that there is still considerable cross-national variations in LLSI when only people of prime age (30–59 years) are considered (e.g. Italy 8.77 vs. Estonia 26.71, in 2007). A number of former 'Eastern bloc' countries (Estonia, Latvia, Lithuania, and Hungary) alongside Portugal tend to report the highest prevalence of limiting longstanding illness. In contrast, several Nordic countries (Finland excluded) and the Benelux- countries report comparatively low levels of LLSI.

Table 2 clearly shows the large differences in educational qualifications that exists across Europe, ranging from 8.72 percent in Portugal (2007) to 36.5 percent in Norway (2011) who hold higher education. Educational dummies is hence included in the regressions. There are no major gender skewness in either of the included samples. The gender skewness is largest in Estonia in 2011, where 58.74 percent are female. Lastly, it should be noted that the descriptive statistics do not make much sense for Bulgaria, where the unemployment prevalence *decreases* in the sample when the economy turned worse. There is apparently something wrong with the LLSI variable as well (very low level in 2007), and the data are clearly not to be trusted in the Bulgarian case.

Analysis

Linear probability models (OLS) are used throughout this paper. Although the dependent variable is a dummy (being unemployed or not), logistic regression is not preferred due to difficulties in the comparison of different samples and model specification [28, 29]. Nevertheless, logistic regression analysis has been performed as well in order to check the robustness of the results. The unemployment variable is regressed on ill health, with controls for marital status, educational qualifications, age and gender, yielding the following equation:

$$\begin{aligned} Unemployed &= \beta_1 Ill\ health + \beta_2 Married \\ &+ \beta_3 Education + \beta_4 Age \\ &+ \beta_5 Woman + \varepsilon \end{aligned}$$

First, the regressions are run separately for the years 2007 and 2011, in order to compare the health coefficients. Afterwards, the data are pooled, and the same models are run along with a dummy variable for crisis year and an interaction term between 2011 and ill health:

$$\begin{aligned} Unemployed &= \beta_1 Ill\ health + \beta_2 Married \\ &+ \beta_3 Education + \beta_4 Age \\ &+ \beta_5 Woman + B_6 Crisis\ year \\ &+ \beta_7 Crisis\ year * Ill\ health + \varepsilon \end{aligned}$$

These models will help us answering whether people with ill health have experienced unemployment to a lesser extent (than those with good health status) in the midst of an economic crisis (2011), compared with a pre-crisis period (2007). Next, a number of sensitivity tests are performed. Both the dependent and independent variable are changed, and logistic regression analysis is run in order to see whether the empirical pattern holds. In the last part of the analysis section, some descriptive statistics are presented, in order to further investigate potential changes in the composition of the unemployment population: (i) The unemployment prevalence among people reporting good and ill health in 2007 and 2011, and (ii) the share of unemployed people stating to have ill health in 2007 and 2011. All of the following analyses are split by country, since we are both interested in cross-national differences, and whether the results fit our crisis classification or not.

Results

Health and unemployment in diverging economic conditions

Table 3 reports results from an OLS regression of unemployment, by LLSI and a number of covariates (education, age, married and woman). The left column reports results for 2007, the right for 2011. Only the health coefficient is shown, since this is our prime interest. The results are *strikingly similar* for almost all of the 28 countries in Table 3. In merely three countries (Lithuania, Spain and Hungary) does the health coefficient change substantially from pre-crisis to crisis year.

In several cases, the health coefficient is almost identical for the two survey years, for instance in Estonia (0.001 and 0.001), the U.K (0.003 and 0.005), Slovakia (0.009 and 0.009) and the Netherlands (0.010 and 0.010). In Portugal, Italy and Norway, there is a slightly higher effect size in 2011 causing the coefficient to become statistically significant. In general, however, the effect size is quite small and often far from significant. This means that in many European countries, there is no major unemployment disadvantage for people with ill health, once education, age, marital status and gender is accounted for. It should nevertheless be noted that there exists a heightened unemployment likelihood for people with LLSI in a number of countries, including Denmark, Slovenia, Austria, Belgium, Germany and Luxembourg.

Table 3 Results from OLS regression of unemployment, by LLSI and covariates

	2007	2011
A. Crisis		
Estonia	0.001 (0.004)	0.001 (0.007)
Greece	0.013** (0.006)	0.004 (0.008)
Ireland	0.007 (0.005)	−0.011 (0.009)
Latvia	0.008 (0.005)	0.007 (0.007)
Lithuania	0.000 (0.005)	−0.018** (0.007)
Spain	0.015*** (0.004)	−0.006 (0.005)
B. Mild crisis		
Bulgaria	−0.037** (0.017)	−0.013** (0.007)
Cyprus	0.003 (0.005)	0.004 (0.006)
Denmark	0.026*** (0.006)	0.020** (0.007)
Hungary	−0.010** (0.004)	−0.000 (0.004)
Iceland	−0.002 (0.005)	−0.005 (0.010)
Portugal	0.008 (0.006)	0.017** (0.006)
Slovenia	0.045*** (0.007)	0.037*** (0.007)
U.K.	0.003 (0.003)	0.005 (0.003)
C. Small increase		
Czech Republic	0.021*** (0.004)	0.017*** (0.004)
France	0.018*** (0.004)	0.015*** (0.004)
Italy	0.004 (0.003)	0.011** (0.003)
Slovakia	0.009 (0.006)	0.009 (0.005)
Sweden	0.016** (0.005)	0.031*** (0.006)
D. No crisis		
Austria	0.021*** (0.004)	0.040*** (0.004)
Belgium	0.035*** (0.006)	0.038*** (0.006)
Finland	0.012** (0.006)	0.014** (0.006)
Germany	0.034*** (0.004)	0.039*** (0.003)
Luxembourg	0.026*** (0.007)	0.037*** (0.006)
Netherlands	0.010*** (0.003)	0.010** (0.003)
Norway	0.003 (0.004)	0.015** (0.005)
Poland	−0.007* (0.004)	−0.007* (0.004)
Romania	−0.001 (0.004)	−0.002 (0.003)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (ref.: 36–45 years)
Only LLSI coefficients shown. Full models available on request

Table 4 Pooled sample: Results from OLS regression of unemployment, by LLSI, 2011, LLSI x 2011, and covariates

	2011	LLSI x 2011
A. Crisis		
Estonia	0.057*** (0.004)	−0.023*** (0.006)
Greece	0.084*** (0.004)	−0.067*** (0.008)
Ireland	0.072*** (0.004)	−0.036*** (0.009)
Latvia	0.090*** (0.004)	−0.042*** (0.008)
Lithuania	0.059*** (0.004)	−0.042*** (0.008)
Spain	0.071*** (0.003)	−0.049*** (0.006)
B. Mild crisis		
Bulgaria	−0.029*** (0.004)	0.039*** (0.017)
Cyprus	0.029*** (0.003)	−0.010 (0.007)
Denmark	0.016*** (0.003)	−0.012 (0.009)
Hungary	0.028*** (0.003)	0.000 (0.005)
Iceland	0.038*** (0.004)	−0.009 (0.012)
Portugal	0.029*** (0.004)	−0.009 (0.007)
Slovenia	0.021*** (0.004)	−0.018** (0.009)
U.K.	0.015*** (0.002)	−0.002 (0.004)
C. Small increase		
Czech Republic	0.012*** (0.003)	−0.008 (0.005)
France	0.005** (0.002)	−0.010* (0.006)
Italy	0.025*** (0.002)	−0.006 (0.004)
Slovakia	0.011** (0.003)	−0.005 (0.007)
Sweden	0.012*** (0.003)	0.012 (0.008)
D. No crisis		
Austria	0.002 (0.003)	0.017** (0.006)
Belgium	−0.003 (0.003)	−0.003 (0.008)
Finland	0.012** (0.004)	−0.002 (0.008)
Germany	−0.016*** (0.002)	0.008 (0.004)
Luxembourg	−0.002 (0.003)	0.010 (0.009)
Netherlands	0.008*** (0.002)	−0.003 (0.004)
Norway	0.002 (0.003)	0.012* (0.007)
Poland	−0.007** (0.002)	0.003 (0.005)
Romania	−0.007** (0.002)	0.005 (0.005)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (ref.: 36–45 years)
Only the coefficients for 2011 and the interaction term LLSI × 2011 is shown. Full models available on request

Table 4 investigates a related question, namely whether people with ill health are unemployed to a lesser extent in the crisis year, when unemployment becomes more widespread across Europe. In other words, has people without health problems experienced the main bulk of the unemployment incidences? The data for 2007 and 2011 are now pooled. The regression is similar as before, except for the inclusion of a dummy variable for crisis year (coefficients shown in left column) and an interaction term between crisis year and LLSI (coefficients shown in right column). The year dummies indicate the extent to which unemployment probabilities have changed for people with good health. The interaction terms, on the other hand, will tell us whether respondents with ill health have a different unemployment likelihood in 2011, compared with 2007.

The 2011 dummy is, naturally, both large and highly significant in all the 'crisis' countries, with an especially large effect size in Latvia (0.090) and Greece (0.084). The crisis dummy is smaller (but still significant) for the 'minor crisis' countries and in the 'small increase' group as well. In the 'no crisis' countries, the year dummy is positive and significant in Finland and the Netherlands (small coefficient in both cases), and significantly *negative* in three countries (Germany, Poland and Romania). Our prime interest, however, is the interaction terms, which show a distinct pattern.

For all of the 'crisis' countries, the interaction term is negative and statistically significant, but this is almost never the case for the remaining 22 countries (the exceptions being Slovenia and France). It is worth noting that the interaction terms are often negative in the 'mild crisis' and 'small increase' group as well, but they are considerably smaller in effect size and fail to reach statistical significance. This shows that both a high *level* and a rapid *increase* in the unemployment rate seems to be necessary in order for people with good health status to become overrepresented in the unemployment population.

Robustness checks

The results presented thus far points to two main findings. First, the unemployment risk for people with ill health is a very stable phenomenon, in the sense that the LLSI coefficient is remarkably similar in 2007 and 2011 for almost all of the 28 European countries. Second, people with good health status has experienced the main bulk of the unemployment incidences during the crisis, but only in countries with both a high and increasing overall unemployment level. However, these results might be sensitive to the choice of independent and dependent variable, and to the choice of linear instead of logistic regression.

The pattern of similarity over time in people with ill health's unemployment probabilities, compared with people with good health, also holds when the independent variable is changed to *bad/fair health* (see Table 8 in appendix). Iceland is the only country where the health coefficient changes somewhat from 2007 to 2011. This is also the case when the dependent variable is changed to *ILO unemployment*, where Spain is the country with most apparent change (see Table 9 in appendix). There is some minor changes in Belgium, Denmark, Finland and Norway as well, but the main finding is still stability over time.

All the regressions have been rerun with a change in the dependent and independent variable on the pooled data as well. The main findings hold in both model specifications, except for a couple of slight differences. First, when *bad/fair health* is used instead of LLSI (see Table 10), the effect size of the interaction term is lowered somewhat in all 'crisis countries', and the interaction is no longer significant in Ireland (b = −0.014, SE = 0.009). Second, the interaction term is now negative and statistically significant on the five percent level for Belgium (b = −0.015), Cyprus (b = −0.013), Iceland (b = −0.024) and the Czech Republic (b = −0.010) as well. Third, when the dependent variable is switched to *ILO unemployment* (see Table 11), the interaction term is negative and significant on the five percent level for Hungary, Italy and the Czech Republic, but the effect sizes are all rather small (between −0.011 and −0.014). These minor inconsistencies do not, however, change the overarching conclusion: that the unemployment likelihood is lowered substantially for people with health issues in countries hit hard by the recession.

The preceding analysis have also been calculated using logistic regression (see Tables 12 and 13). It should be stressed that it is challenging to compare results across different samples using logistic regression, because the variance is fixed (at 3.29) in the logistic distribution causing more problems with unobserved heterogeneity in the model specification [28, 29]. However, if the main empirical pattern derived from the linear models is found using logistic regression analysis as well, we can be more confident in the presented findings. This definitely seems to be the case for both the analysis split by survey year (Table 12) and the analysis of the pooled data (Table 13). Regarding the former, there are few noticeable changes from 2007 to 2011 (main exceptions: Greece, Spain, Hungary and Norway). For the latter, there is still a lower unemployment likelihood for people with ill health in the 'crisis countries', although the interaction term fails to reach statistical significance for both Estonia and Latvia. Furthermore, it should be noted that the interaction term is negative and significant for Denmark and Slovenia as well. To summarize, the choice of linear over logistic regression analysis does not seem to be responsible for the presented findings.

Compositional changes: descriptive evidence

Lastly, we turn to some descriptive evidence on the compositional changes of the unemployment population. For brevity, only the results for the main dependent and independent variable are presented. The main reason for people with ill health's unemployment probability being lower in 2011 in the 'crisis countries' is shown in Table 5, where the percentages of people with good health (left columns) and LLSI (right columns) who report to be unemployed is shown for the two survey years. Clearly, the differences between 2007 and 2011 are larger in the good health group than in the LLSI group. In Latvia, for instance, the increase in unemployment prevalence is

Table 5 Unemployment prevalence in 2007 and 2011 among people with good health (1) and LLSI (2) (percent)

	(1) Good health		(2) LLSI	
A. Crisis	2007	2011	2007	2011
Estonia	3.45	8.56***	2.34	5.36***
Greece	5.44	13.61***	2.98	4.26**
Ireland	3.80	10.97***	3.24	6.98***
Latvia	4.83	13.65***	3.53	7.91***
Lithuania	4.20	9.92***	2.81	4.33***
Spain	6.37	13.12***	5.26	6.85***
B. Mild crisis	2007	2011	2007	2011
Bulgaria	15.28	11.30***	4.17	4.25
Cyprus	2.75	5.67***	1.66	3.22**
Denmark	1.90	3.31***	4.57	4.90
Hungary	5.81	8.44***	2.64	5.30***
Iceland	0.87	4.55***	0.57	3.47***
Portugal	6.05	8.63***	4.07	5.47***
Slovenia	5.84	7.73***	8.24	8.17
U.K.	1.78	3.22***	1.48	2.69***
C. Small increase				
Czech Republic	3.67	4.39**	3.86	3.86
France	5.27	5.56	5.07	4.90
Italy	5.34	7.77***	2.40	4.34***
Slovakia	5.84	6.93**	3.93	4.56
Sweden	2.55	3.53**	3.48	5.63**
D. No crisis	2007	2011	2007	2011
Austria	3.04	3.22	4.00	5.98**
Belgium	5.84	5.73	8.40	8.26
Finland	4.97	5.84**	5.66	6.30
Germany	5.05	3.69***	7.28	6.43*
Luxembourg	4.08	3.56*	5.30	6.22
Netherlands	0.88	1.60***	2.00	2.23
Norway	1.67	1.59	1.73	3.02*
Poland	8.66	7.35***	4.26	3.58**
Romania	3.73	2.98***	1.26	0.81*

Notes
T-test on the difference between 2007 and 2011
Significance levels: *** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1

much larger among those reporting good health (from 4.83 to 13.65) than among those with LLSI (from 3.53 to 7.91). This pattern holds for all six 'crisis countries', and is most evident in Spain and Greece. The difference between people with good health and people reporting LLSI is – as shown in Table 4 above – statistically significant on the 99 percent level for all the 'crisis countries'. People with LLSI have experienced significantly less of the unemployment increase in Slovenia as well, whereas the opposite is the case in Austria and Norway. The latter result is easy to notice in Table 5, where it is only among people reporting LLSI there is a significant increase in unemployment prevalence (e.g. Austria: from 3.04 to 3.22 for good health, and from 4.00 to 5.98 for LLSI).

Further evidence of the changing health composition is presented in Table 6, which shows the share of unemployed people stating to have LLSI. For all six 'crisis countries', the share of people reporting health problems

Table 6 Share of the unemployed stating to have LLSI in 2007 and 2011 (percent)

	2007	2011
A. Crisis		
Estonia	24.86 (N = 366)	24.14 (N = 642)
Greece	10.34 (N = 619)	8.24 (N = 1457)
Ireland	18.45 (N = 401)	12.01*** (N = 841)
Latvia	24.88 (N = 410)	22.10 (N = 1575)
Lithuania	19.42 (N = 417)	12.31*** (N = 804)
Spain	14.16 (N = 1773)	10.63*** (N = 3461)
B. Mild crisis		
Bulgaria	1.32 (N = 1367)	5.97*** (N = 1575)
Cyprus	13.08 (N = 214)	14.43 (N = 485)
Denmark	30.08 (N = 133)	22.63 (N = 190)
Hungary	16.74 (N = 890)	17.83 (N = 1879)
Iceland	8.33 (N = 24)	13.74 (N = 131)
Portugal	21.88 (N = 544)	20.89 (N = 962)
Slovenia	25.50 (N = 549)	30.30* (N = 726)
U.K.	19.41 (N = 273)	20.26 (N = 454)
C. Small increase		
Czech Republic	21.68 (N = 655)	22.05 (N = 567)
France	17.67 (N = 1058)	18.99 (N = 1153)
Italy	7.74 (N = 2132)	13.05*** (N = 2750)
Slovakia	13.85 (N = 686)	19.52*** (N = 835)
Sweden	24.34 (N = 189)	23.55 (N = 259)
D. No crisis		
Austria	23.43 (N = 431)	35.89*** (N = 443)
Belgium	22.79 (N = 768)	24.35 (N = 694)
Finland	26.23 (N = 469)	27.36 (N = 541)
Germany	30.17 (N = 1442)	36.49*** (N = 1055)
Luxembourg	14.97 (N = 334)	18.51 (N = 443)
Netherlands	32.11 (N = 109)	28.02 (N = 182)
Norway	18.81 (N = 101)	27.38 (N = 84)
Poland	11.99 (N = 2528)	12.26 (N = 1843)
Romania	6.57 (N = 563)	8.18 (N = 391)

Notes
T-test on the difference between 2007 and 2011
Significance levels: *** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Number of observations in parentheses

among the unemployed is lower in 2011 than in 2007 (only significantly so in Ireland, Lithuania and Spain). Remember, however, that these are the "raw" and unadjusted differences, and the number of observations are much more limited when the data are structured in this manner (e.g. Estonia: N = 366 and 642). The statistical uncertainty is therefore a more pressing issue. For the 22 remaining countries there tends to be *more* people with ill health in the unemployment population in the crisis year, although these upward changes are only significant in Austria, Germany and Italy (Slovenia on the ten percent level). Denmark, Portugal, Sweden and the Netherlands are the exceptions, where there are slightly less (but never significantly so) people with LLSI among the unemployed in 2011.

To summarize, people with ill health's unemployment likelihood, compared with people reporting good health, is *remarkably stable* over time in Europe, and there is no evidence of the relationship being modified by a sudden increase in the unemployment rate. However, a different empirical pattern emerges when we pool the data for 2007 and 2011, and investigate the interplay between ill health and crisis year. People with ill health have a *lower* unemployment probability in the crisis year, but only in countries hit hard by the recession as indicated by a high and rising unemployment level. This result is mainly due to *compositional changes* on health characteristics in the unemployment population, as people reporting good health have experienced unemployment to a higher extent than those with ill health in the 'crisis countries'. In the following and last section, the presented results will be discussed in greater detail.

Discussion

Before we turn to a discussion of the findings, a number of important shortcomings should be mentioned. The empirical strategy in this paper only provides us with "snapshots", and we are not able to say to what degree the presented statistical associations are of a *causal* nature (i.e. that people lose their jobs because of bad health status). Similarly, the naïve regression approach chosen cannot help us teasing out the extent to which the relationship between ill health and unemployment likelihood is driven by selective processes, health effects of unemployment, and/ or omitted variable bias (e.g. personality characteristics, cognitive abilities, etc.). It is highly likely, however, that the main bulk of the changing association between health and unemployment likelihood in the 'crisis countries' is due to selective processes, for two reasons. Firstly, because of the large numbers of unemployment episodes, which probably outnumber health declines due to unemployment. Secondly, there is no general trend towards more ill health being reported in 2011 among the 'crisis countries' (see Table 2), as one would expect if people deteriorate in health because of the unemployment experience.

Furthermore, the data material is not detailed enough to disentangle to what extent the unemployment prevalence is of a short- or a long-term kind, and whether there are health differentials in the length of the unemployment spell. It might be the case, for instance, that people with ill health are overrepresented among the long-term unemployed, because they have trouble in accessing the labor market [11–13]. This could, in fact, be a particularly pressing issue in the 'crisis countries', where the demand for labor has been continuingly low in the years 2008–2011. This means that employers can "skim the cream" to a higher extent in recruitment processes, and all negative productivity signals (e.g. bad health status, previous unemployment episodes, old age) attached to an applicant will most likely lead to a lower hiring probability. Consequently, even though people with ill health have experienced the rise in unemployment to a lower extent overall than people with good health in the 'crisis countries', they could still be overrepresented among those who are more permanently disadvantaged on the labor market (i.e. the long-term unemployed).

There is some evidence indicating that vulnerable groups are underrepresented in (a number of) the EU-SILC samples. When comparing the official Eurostat unemployment statistics with the reported unemployment in EU-SILC, there were some noticeable differences. In Ireland, the reported amount of unemployment is 3.7 and 10.26 for the years 2007 and 2011 respectively, while the official statistics was 4.7 and 14.7. This could be due to *underreporting*, i.e. respondents (wrongly) classifying themselves as something other than unemployed. If people with ill health do this to a higher extent than those with good health, the presented results could be biased. There is, however, no reason to suspect that this tendency should be much stronger in the 'crisis countries', and the main findings of this study are probably not driven by such processes. Additionally, it is possible that those not reached in the surveys (and/ or the non-response group) has a high probability of both being unemployed and having health problems, which would bias the estimates. Yet, given the fact that – for most countries – between 20 and 30 percent report to have a limiting longstanding illness, it seems unlikely that people with health issues are severely underrepresented in the sample.

This study has investigated the following research question: *Do people with ill health experience unemployment to a lesser extent than those with good health during the economic downturn in Europe?* The answer is yes, but only in countries in which there is both a high and rapidly growing unemployment rate. This means that the overall *health composition* has changed for the healthier in the countries classified as experiencing a

full-blown crisis. In the remaining countries, in contrast, the unemployment prevalence for people with LLSI have – if anything – increased. Thus, evidence from 28 European countries indicates that less severe economic downturns will probably not change the health composition of the unemployment population at all, only a severe crisis will.

The remaining question is how to explain this empirical pattern? That people with ill health are selected for unemployment in a crisis of minor or intermediate level is no surprise, and there are at least four reasons to expect this. Firstly, health status might function as a *productivity proxy*, and employers might therefore be reluctant to hire (and more inclined to fire) those with ill health. Secondly, because people with ill health often have troubles in accessing the labor market they will have *less seniority* [30, 31], and therefore a higher lay-off risk. Thirdly, the problems in gaining employment for those with health troubles could be due to *scarring effects of unemployment* [32, 33]. Hence, employers might be indifferent to the health status per se, but rather be skeptical about the accumulated unemployment on the CV, yielding lower hiring probability and less seniority. Fourthly and lastly, some employers might even have *discriminatory preferences* [34, 35] against those with health problems, possibly causing both difficulties in gaining employment and a higher unemployment likelihood.

These processes are, however, not as important during severe recessions, when unemployment becomes a mass phenomenon. In this situation, employers have to make large numbers of employees redundant (e.g. when an entire factory closes down), and there will naturally be less selectivity on both health- and other characteristics. And because having good health is more common than having health problems, the unemployment population will inevitably take a compositional change for the healthier.

Another important question is how the findings from this paper corresponds to the existing literature on health and unemployment. Our results might seem to contradict those of a recent study also employing the EU-SILC, which finds that people with health limitations were *more* prone to unemployment in Europe [36]. However, the study uses longitudinal data (with accompanying attrition difficulties) and the sample is limited to people employed at the start of the observational window, making the comparison of results with the current study very challenging.

More in line with our empirical strategy are two studies of unemployment and mortality rates from Finland, who experienced a severe economic crisis in the 1990's. The unemployment rate was approximately 5 % until 1989. By 1992, the unemployment rate was 15 %, and reached a peak of 19 % in 1994. Excess mortality of individuals who experienced unemployment before the rise in unemployment was greater than for individuals experiencing unemployment during the recession [37]. Similarly, a more recent Finnish study found that the mortality hazard of the unemployed were considerably higher during the more favorable economic climate, and the association between mortality and unemployment were weaker among workers in strongly downsizing firms [38]. Correspondingly, findings from Australia indicate that young unemployed peoples' health is worse when the unemployment rate is low, compared to when the unemployment rate is high [39].

These findings fit well with our results, showing that the unemployed are "healthier" on average in European countries where the unemployment rate is both high and rising. In other words, the unemployment population is *positively selected* on health characteristics in 'crisis countries', something which probably is able to explain the less serious health effects of unemployment found in the three above-mentioned studies. The main alternative explanation can be termed "*the more, the merrier*". It is possible that there is less psychosocial stress and stigma associated with being unemployed when redundancies are more widespread, and that the negative health consequences therefore are muted. Although this could be a key factor in some cases, it is probably much less important than the explanation emphasizing that the unemployment population is positively selected on health. Results from the present paper highlights the importance of such selective processes, and how these are related to the severity of the economic crisis. Future comparative research – preferably using individual level longitudinal data with a longer time span than the EU-SILC – should investigate whether the health effects of unemployment are less prominent in countries where unemployment became a mass phenomenon during "the Great Recession".

Conclusion

There has to be a rather sever economic downturn in order for the health composition of the unemployment population to change significantly. In countries with a high and increasing overall unemployment rate, people with ill health experience unemployment to a *lower* extent than people with good health. This tendency is not observed for countries in which there is a "milder" crisis. If anything, people with ill health seems to be *more* prone to unemployment in countries where the crisis impact is on a small or intermediate level. This could indicate that people with LLSI are among the first to be laid off when the economy takes a turn for the worse. However, only when there is a full-blown economic crisis – with a high and rapidly increasing unemployment level – will the unemployment composition change for the better in health terms.

Appendix

Table 7 Number of observations for 28 European countries in 2007 and 2011

Country	2007	2011
Austria	13382	11471
Belgium	12234	11203
Bulgaria	9261	15324
Cyprus	8453	9491
Czech Republic	17666	13309
Denmark	5782	5322
Estonia	11872	8585
Finland	9138	9073
France	20215	21260
Germany	25932	24170
Greece	12346	12641
Hungary	18403	24609
Iceland	2869	3005
Ireland	10885	8196
Italy	43666	39062
Latvia	9266	13388
Lithuania	10885	9397
Luxembourg	7908	11448
Netherlands	10211	10465
Norway	6001	4603
Poland	32798	28304
Portugal	9942	12488
Romania	17042	15974
Slovakia	12533	13271
Slovenia	8701	9238
Spain	28652	28941
Sweden	6925	6700
United Kingdom	15972	14670

Notes
Only participants who answered the health questions are included in the sample
Individuals with missing information on health variables were dropped
2007 EU-SILC- data not available for Croatia, Malta and Switzerland

Table 8 Sensitivity test: Results from OLS regression of unemployment, by bad/fair health and covariates

	2007	2011
A. Crisis		
Estonia	0.015*** (0.004)	0.030*** (0.007)
Greece	0.012** (0.005)	0.016** (0.007)
Ireland	0.004 (0.005)	0.009 (0.009)
Latvia	0.022*** (0.005)	0.032*** (0.007)
Lithuania	0.012** (0.005)	0.029*** (0.007)
Spain	0.021*** (0.003)	0.014** (0.005)
B. Mild crisis		
Bulgaria	0.033** (0.009)	0.024*** (0.006)
Cyprus	0.010** (0.005)	0.009 (0.006)
Denmark	0.024*** (0.005)	0.027*** (0.006)
Hungary	0.012** (0.004)	0.038*** (0.004)
Iceland	0.016*** (0.004)	0.001 (0.009)
Portugal	0.017** (0.006)	0.030*** (0.006)
Slovenia	0.034*** (0.006)	0.047*** (0.007)
U.K.	0.005* (0.003)	0.010** (0.003)
C. Small increase		
Czech Republic	0.030*** (0.004)	0.022*** (0.004)
France	0.018*** (0.004)	0.018*** (0.004)
Italy	0.013*** (0.002)	0.024*** (0.003)
Slovakia	0.013** (0.005)	0.025*** (0.005)
Sweden	0.023*** (0.005)	0.031*** (0.006)
D. No crisis		
Austria	0.040*** (0.004)	0.051*** (0.004)
Belgium	0.053*** (0.005)	0.042*** (0.006)
Finland	0.031*** (0.006)	0.033*** (0.006)
Germany	0.045*** (0.003)	0.045*** (0.003)
Luxembourg	0.034*** (0.006)	0.031*** (0.004)
Norway	0.010** (0.004)	0.018*** (0.005)
Netherlands	0.009*** (0.003)	0.010** (0.003)
Poland	0.008** (0.004)	0.016*** (0.004)
Romania	0.003 (0.004)	0.002 (0.003)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (ref.: 36–45 years)
Only bad/fair health coefficients shown. Full models available on request

Table 9 Sensitivity test: Results from OLS regression of ILO unemployment, by LLSI and covariates

	2007	2011
A. Crisis		
Estonia	0.002 (0.004)	0.005 (0.007)
Greece	0.005 (0.005)	-0.000 (0.007)
Ireland	-0.010** (0.004)	-0.036*** (0.009)
Latvia	0.007 (0.005)	0.018** (0.006)
Lithuania	-0.002 (0.004)	-0.010 (0.007)
Spain	0.010** (0.004)	-0.010** (0.005)
B. Mild crisis		
Bulgaria	-0.025** (0.012)	-0.004 (0.006)
Cyprus	0.004 (0.005)	0.007 (0.006)
Denmark	0.014** (0.005)	0.005 (0.007)
Hungary	-0.001 (0.004)	-0.003 (0.004)
Iceland	0.003 (0.007)	0.004 (0.011)
Portugal	-0.003 (0.005)	0.002 (0.005)
Slovenia	0.010** (0.005)	0.009* (0.005)
U.K.	0.003 (0.003)	0.008** (0.004)
C. Small increase		
Czech Republic	0.021*** (0.004)	0.015*** (0.004)
France	0.009** (0.004)	0.007* (0.004)
Italy	0.004 (0.003)	0.007** (0.003)
Slovakia	0.011** (0.005)	0.006 (0.005)
Sweden	-0.002 (0.005)	0.007 (0.006)
D. No crisis		
Austria	0.005 (0.004)	0.012** (0.004)
Belgium	0.010** (0.005)	-0.000 (0.005)
Finland	0.009* (0.005)	-0.001 (0.005)
Germany	0.016*** (0.003)	0.019*** (0.003)
Luxembourg	0.015** (0.007)	0.013** (0.005)
Netherlands	0.014*** (0.003)	0.006** (0.002)
Norway	0.003 (0.004)	0.018*** (0.005)
Poland	-0.007** (0.003)	-0.009** (0.003)
Romania	-0.004 (0.004)	-0.001 (0.003)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (ref.: 36–45 years)
Only LLSI coefficients shown. Full models available on request

Table 10 Sensitivity test, pooled sample: Results from OLS regression of unemployment, by bad/fair health, 2011, bad/fair health × 2011, and covariates

	2011	Bad/fair health × 2011
A. Crisis		
Estonia	0.056*** (0.004)	-0.013** (0.006)
Greece	0.089*** (0.004)	-0.063*** (0.008)
Ireland	0.068*** (0.004)	-0.014 (0.009)
Latvia	0.097*** (0.006)	-0.033*** (0.008)
Lithuania	0.062*** (0.005)	-0.022** (0.007)
Spain	0.076*** (0.003)	-0.039*** (0.005)
B. Mild crisis		
Bulgaria	-0.031*** (0.005)	0.012 (0.008)
Cyprus	0.030*** (0.003)	-0.013* (0.007)
Denmark	0.014*** (0.004)	-0.003 (0.007)
Hungary	0.027*** (0.003)	0.008* (0.005)
Iceland	0.041*** (0.005)	-0.024** (0.010)
Portugal	0.030*** (0.005)	-0.006 (0.007)
Slovenia	0.021*** (0.005)	-0.000 (0.008)
U.K.	0.015*** (0.002)	0.001 (0.004)
C. Small increase		
Czech Republic	0.015*** (0.003)	-0.010** (0.004)
France	0.005* (0.003)	-0.007 (0.005)
Italy	0.026*** (0.002)	-0.003 (0.003)
Slovakia	0.010** (0.004)	0.004 (0.006)
Sweden	0.013*** (0.003)	0.005 (0.007)
D. No crisis		
Austria	0.002 (0.003)	0.011** (0.005)
Belgium	0.001 (0.004)	-0.015** (0.007)
Finland	0.012** (0.004)	-0.003 (0.007)
Germany	-0.012*** (0.002)	0.004 (0.004)
Luxembourg	-0.001 (0.003)	-0.003 (0.007)
Netherlands	0.008*** (0.002)	-0.003 (0.004)
Norway	0.001 (0.003)	0.009 (0.006)
Poland	-0.010*** (0.003)	0.008* (0.004)
Romania	-0.008*** (0.002)	0.006* (0.004)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (Ref.: 36–45 years)
Only the coefficients for 2011 and the interaction term bad/fair health × 2011 is shown. Full models available on request

Table 11 Sensitivity test, pooled sample: Results from OLS regression of ILO unemployment, by LLSI, 2011, LLSI × 2011, and covariates

	2011	LLSI × 2011
A. Crisis		
Estonia	0.061*** (0.004)	-0.022** (0.006)
Greece	0.076*** (0.003)	-0.057*** (0.008)
Ireland	0.073*** (0.004)	-0.049*** (0.009)
Latvia	0.083*** (0.004)	-0.031*** (0.008)
Lithuania	0.058*** (0.004)	-0.031*** (0.007)
Spain	0.066*** (0.002)	-0.048*** (0.006)
B. Mild crisis		
Bulgaria	0.012*** (0.003)	0.013 (0.013)
Cyprus	0.029*** (0.003)	-0.013* (0.007)
Denmark	0.020*** (0.003)	-0.015* (0.009)
Hungary	0.031*** (0.003)	-0.011** (0.005)
Iceland	0.044*** (0.005)	-0.009 (0.014)
Portugal	0.023*** (0.004)	-0.010 (0.007)
Slovenia	0.016*** (0.003)	-0.009 (0.006)
U.K.	0.018*** (0.002)	-0.002 (0.004)
C. Small increase		
Czech Republic	0.010*** (0.002)	-0.011** (0.005)
France	0.007** (0.002)	-0.006 (0.005)
Italy	0.031*** (0.002)	-0.014*** (0.004)
Slovakia	0.015** (0.003)	-0.012* (0.007)
Sweden	0.011*** (0.003)	0.003 (0.008)
D. No crisis		
Austria	0.001 (0.002)	0.005 (0.005)
Belgium	0.004 (0.003)	-0.011* (0.006)
Finland	0.014*** (0.003)	-0.011* (0.006)
Germany	-0.014*** (0.002)	0.008** (0.004)
Luxembourg	-0.006** (0.003)	-0.001 (0.009)
Netherlands	-0.001 (0.002)	-0.007* (0.004)
Norway	-0.001 (0.003)	0.015** (0.007)
Poland	0.008*** (0.002)	-0.007 (0.004)
Romania	-0.005** (0.002)	0.006 (0.004)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (Ref.: 36–45 years)
Only the coefficients for 2011 and the interaction term LLSI × 2011 is shown. Full models available on request

Table 12 Results from logistic regression of unemployment, by LLSI and covariates

	2007	2011
A. Crisis		
Estonia	1.000 (0.134)	1.008 (0.107)
Greece	1.708*** (0.258)	1.104 (0.122)
Ireland	1.281* (0.182)	0.864 (0.106)
Latvia	1.225 (0.154)	1.076 (0.077)
Lithuania	0.974 (0.133)	0.754** (0.090)
Spain	1.378*** (0.103)	0.908 (0.057)
B. Mild crisis		
Bulgaria	0.536** (0.141)	0.753** (0.089)
Cyprus	1.214 (0.265)	1.118 (0.161)
Denmark	2.436*** (0.495)	1.693** (0.316)
Hungary	0.774** (0.077)	1.020 (0.071)
Iceland	0.790 (0.596)	0.820 (0.220)
Portugal	1.188 (0.137)	1.327** (0.120)
Slovenia	2.167*** (0.243)	1.703*** (0.158)
U.K.	1.221 (0.200)	1.212 (0.153)
C. Small increase		
Czech Republic	2.030*** (0.214)	1.645*** (0.186)
France	1.495*** (0.132)	1.427*** (0.117)
Italy	1.253** (0.109)	1.314*** (0.082)
Slovakia	1.240* (0.150)	1.204* (0.117)
Sweden	1.812** (0.326)	2.273*** (0.365)
D. No crisis		
Austria	2.053*** (0.257)	2.791*** (0.310)
Belgium	1.767*** (0.170)	1.911*** (0.193)
Finland	1.274** (0.146)	1.299** (0.138)
Germany	1.867*** (0.121)	2.295*** (0.168)
Luxembourg	1.962** (0.329)	2.640*** (0.360)
Netherlands	2.130** (0.464)	1.740** (0.305)
Norway	1.225 (0.326)	2.185** (0.577)
Poland	0.880* (0.059)	0.859** (0.067)
Romania	0.945 (0.171)	0.830 (0.164)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (Ref.: 36-45 years)
Only the odds ratio for LLSI is shown. Full models available on request

Table 13 Pooled sample: Results from logistic regression of unemployment, by LLSI, 2011, LLSI × 2011, and covariates

	2011	LLSI × 2011
A. Crisis		
Estonia	3.027*** (0.240)	0.930 (0.148)
Greece	2.978*** (0.161)	0.611** (0.106)
Ireland	3.397*** (0.243)	0.690** (0.123)
Latvia	3.302*** (0.222)	0.823 (0.113)
Lithuania	2.673*** (0.188)	0.670** (0.116)
Spain	2.388*** (0.080)	0.654*** (0.062)
B. Mild crisis		
Bulgaria	0.760*** (0.032)	1.348 (0.382)
Cyprus	2.104*** (0.190)	1.079 (0.266)
Denmark	1.944*** (0.264)	0.579** (0.154)
Hungary	1.528*** (0.072)	1.390** (0.157)
Iceland	5.708*** (1.348)	1.069 (0.842)
Portugal	1.539*** (0.098)	1.056 (0.146)
Slovenia	1.412*** (0.099)	0.743** (0.102)
U.K.	1.895*** (0.167)	1.020 (0.202)
C. Small increase		
Czech Republic	1.331*** (0.090)	0.862 (0.126)
France	1.121** (0.055)	0.856 (0.099)
Italy	1.545*** (0.050)	1.222* (0.127)
Slovakia	1.195** (0.071)	0.987 (0.146)
Sweden	1.545*** (0.174)	1.296 (0.302)
D. No crisis		
Austria	1.046 (0.087)	1.363* (0.216)
Belgium	0.951 (0.060)	0.989 (0.132)
Finland	1.244** (0.096)	0.970 (0.146)
Germany	0.657*** (0.034)	1.195* (0.111)
Luxembourg	0.934 (0.076)	1.233 (0.254)
Netherlands	1.872*** (0.275)	0.660 (0.177)
Norway	1.106 (0.191)	1.735 (0.627)
Poland	0.908** (0.031)	0.983 (0.096)
Romania	0.802** (0.057)	0.991 (0.254)

Significance level
*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1
Covariates
Gender dummy, marital status dummy, two educational level dummies, and five age dummies (Ref.: 36–45 years)
Only the coefficients for 2011 and the interaction term LLSI × 2011 is shown. Full models available on request

Abbreviations
EU-SILC: European Union Statistics on Income and Living Conditions; ILO: International Labor Organization; LLSI: limiting, longstanding illness; OLS: ordinary least squares regression; SRH: self-rated general health.

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
KH conceived the research idea, facilitated the data material, performed the statistical analyses, and drafted the paper. ED contributed substantially in the interpretation of results and drafting of the manuscript. Both authors have read and approved the final manuscript.

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Acknowledgments
This paper is a part of the project "Health Inequalities, Economic Crisis, and the Welfare State", financed by The Research Council of Norway (grant number: 221037). The funding body had no role in study design, data collection, data analysis, interpretation, or writing of the paper. An earlier version of this study was presented on a workshop on economic crisis and population health in Oslo 18.-19. May, and we would like to thank the participants for valuable comments. All remaining errors are the authors' own.

Received: 30 July 2015 Accepted: 26 October 2015
Published online: 04 November 2015

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Paper 5

Kristian Heggebø and Jon Ivar Elstad: “The more, the merrier”? Effects of unemployment on self-rated health in 25 European countries with diverging macroeconomic conditions. Re-submitted, *European Sociological Review*.

“The more, the merrier”?

Effects of unemployment on self-rated health in 25 European countries with diverging macroeconomic conditions

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Abstract

"The more, the merrier"? Effects of unemployment on self-rated health in 25 European countries with diverging macroeconomic conditions

The economic crisis in Europe since 2008 has led to high unemployment levels in several countries. Previous research suggests that becoming unemployed is a health risk, but is job loss and unemployment easier to cope with when unemployment is widespread? Using EU-SILC panel data (2010-2013), this study examines short-term effects of unemployment on self-rated health in 25 European countries with diverging economic conditions. OLS regressions show that the unemployed are in worse health than the employed throughout Europe. The association is reduced considerably, but remains significant in several countries, when time-invariant personal characteristics are accounted for using individual-level fixed effects models. Propensity score kernel matching shows that both being and becoming unemployed is associated with (marginally) worse self-rated health. There is a slight tendency towards less health effects of unemployment in countries where the experience is widely shared, but the main pattern is cross-national similarity. Countries with a very low unemployment rate stand somewhat out with larger differences, suggesting that the composition of the unemployed population is of major importance for (cross-national differences in) health effects of unemployment.

Keywords: Unemployment, self-rated health; health effects; propensity score matching; difference-in-difference; fixed effects; Europe

Introduction

The Great Recession has led to high unemployment rates, and the average in the EU-28 countries rose from 7.0 percent in 2008 to 10.9 percent in 2013 (Eurostat, 2016a). Unemployment involves both income loss and human capital devaluation, and people with 'gaps' in their work careers will struggle to gain re-employment (Birkelund, Heggebø and Rogstad, 2016; Eriksson and Rooth, 2014; Kroft, Lange and Notowidigdo, 2013). Unemployment is clearly undesirable, but is it also detrimental for health? And will negative health effects be less pronounced when unemployment is high? Health differences between employed and unemployed could narrow during a crisis because of less stigma and self-blame when the experience is widely shared, or because the composition of the unemployed changes when also skilled and productive workers become unemployed during an economic downturn.

The central topic of the present study is the relationship between country-level unemployment rates and health effects of unemployment. We use panel data from EU-SILC, which are harmonized surveys of level of living conducted across Europe (Eurostat, 2016b). 25 European countries, representing different levels of and trends in unemployment rates, are analyzed. Focus is on self-rated general health (SRH) – a generic health measure likely to be sensitive for the material and psychological stress which could affect the unemployed (Singh-Manoux et al., 2006). The aim is to contribute to the existing literature in three ways. First, the cross-national comparative approach – analyses of 25 countries with diverging macroeconomic conditions – will extend our knowledge about the unemployment—health association. Second, we approach the complex issue of causal effects of unemployment by discussing results from three statistical techniques: ordinary least square (OLS) regression, individual level fixed effects (FE) models, and propensity score matching (PSM). Third, we try to disentangle between the explanatory mechanisms involved when effects of unemployment on health vary with the country's overall unemployment level.

Previous research and theory

Previous research

It is well documented that the employed tend to have better health than the unemployed. Whether this association varies with overall economic conditions is unclear, however, but several studies indicate *less* negative health effects of unemployment during economic downturns. Thus, analysis of Swedish register data found no excess mortality due to suicide among the unemployed during a recession, the opposite being the case when the economy was improving (Garcy and Vågerö, 2013). Using the Finnish recession in the 1990's as a 'natural experiment', Martikainen and Valkonen (1996) found a weaker unemployment-mortality association when overall unemployment increased. Another Finnish study showed that mortality was lower among individuals working in strongly downsizing firms (Martikainen, Mäki and Jäntti, 2007). In Britain, Clark (2003) showed that well-being among unemployed was better if unemployment was high in the area or affecting other household members, while Gathergood (2013) showed that people entering unemployment in high unemployment areas deteriorated less in psychological health. Lastly, an Australian study found worse health among young unemployed when unemployment was low (Scanlan and Bundy, 2009).

Other studies give scant support, however, to the hypothesis that health effects are less pronounced when unemployment rates are high. Swedish studies which addressed somatic and psychological symptoms (Novo, Hammarström and Janlert, 2000) and mortality risk (Åhs and Westerling, 2006) among the unemployed, did not find any noticeable association with the overall unemployment level. Evidence from Greece has even pointed to *worse* health effects of unemployment when the unemployment rate is high (Drydakis, 2015). A Canadian study using multilevel techniques gave no support to the idea that effects of unemployment on health vary as a function of the unemployment rate (Beland, Birch and Stoddart, 2002).

Noelke and Beckfield (2014) found that recessions increased mortality risk among older American workers who lost their jobs, while job loss in booming economic conditions was not associated with mortality. Recessionary labor market conditions have moreover been found to be associated with increased risk of cardiovascular disease among older Americans experiencing job loss (Noelke and Avendano, 2015).

The above-mentioned studies[1] have only used data from one specific country, and unemployment rates vary much between research contexts. This could explain the mixed findings, since there may be an important distinction between a deep recession (e.g. Finland in the 90's) and 'normal' business cycle fluctuations. A cross-national perspective could provide more insight into the relationship between health and unemployment during 'busts and booms'. A few studies have applied a comparative approach. Oesch and Lipps (2012), analyzing German and Swiss data, did not find that the regional unemployment rate had any mitigating effect on well-being among the unemployed. Likewise, Buffel, Dereuddre and Bracke (2015), examining 27 countries with multilevel methods, showed that the unemployed did not have poorer mental health or used antidepressants more in countries with low unemployment rates. Another study of 16 countries reached similar conclusions when focusing on older adults and regional unemployment rates (Buffel, Missinne and Bracke, 2016). In summary, existing evidence is mixed regarding the health effects of unemployment in diverging macroeconomic conditions.

Theory and hypotheses

Two main 'mechanisms' could explain a weaker unemployment-health association during an economic crisis. There may be *less stigma* and *self-blame* when the unemployment experience is widely shared. Clark and Oswald (1994:p.657) commented that their findings "indicate that it is harder to put up with unemployment if one lives in a place where few people are without

a job", and Turner (1995:p.215) suggested that unemployed "…would be more likely to attribute their job loss to some sort of personal failing…" if the unemployment rate in the area is low. When unemployment increases, people will probably view their unemployment more as a structural problem and less of a personal disgrace. Unemployment may also be easier to cope with if also friends and relatives are unemployed.

Also a *changed composition* of the unemployed population could be of importance. When labor demand is high, individuals who are disadvantaged as to education and health – and perhaps regarding personality traits and cognitive abilities as well – will probably constitute a considerable part of the unemployed population. When unemployment rises, this could change. Productive and highly skilled workers will lose their jobs too because of downsizing and firm closure. Such unemployed individuals could have better coping skills and better health-related behaviors than the typical unemployed when unemployment is low, and they are less likely to have had physically demanding work in the past. Their health when becoming unemployed may therefore be relatively good, and their resources for withstanding health deterioration may be better. Thus, research has suggested that the unemployed are healthier on average in countries with a severe economic crisis (Heggebø and Dahl, 2015).

However, the mixed findings reviewed above suggest possibilities for the opposite pattern; that unemployment has *worse* health consequences when unemployment is high. Being unemployed could be especially damaging for health during an economic slump, because there is no apparent way out of the situation. When labor demand is low, more jobless people will compete for fewer available job openings (Noelke and Beckfield, 2014), causing *low re-employment likelihood*. Unemployment could therefore be associated with more deteriorated health among the unemployed during an economic crisis, because feelings of hopelessness could be more widespread.

In line with the discussion above, the present study will examine three hypotheses.

Hypothesis 1. Unemployment has negative effects on self-rated health, irrespective of national context and macroeconomic conditions. The present study uses data from 25 European countries in order to examine this well-known hypothesis.

Hypothesis 2. Negative health effects of unemployment are less pronounced in high-unemployment countries, compared to countries with an intermediate or low overall unemployment rate. This hypothesis is in line with the assumption that when unemployment is widespread, the experience of unemployment hurts less, but changes in the composition of the unemployed population could also generate this empirical pattern.

Hypothesis 3. Negative health effects of unemployment are larger in countries with a high and growing unemployment rate, compared to countries where the unemployment rate is high, but falling. This hypothesis focuses on the 'economic climate'; being unemployed could be easier to deal with when the economy is improving.

Data and methods

Classification of 25 European countries

The economic crisis started in 2008 and seemed to peak in 2013 when average unemployment in the European Union was close to 11 per cent. After 2013, unemployment rates have gone down in several countries (Eurostat 2016a). The countries included in this study were classified according to two dimensions: average *level* of unemployment 2010-2013, and *trend* in unemployment during these years. Table 1 shows that the average unemployment rate was above ten percent in eight countries (Spain, Latvia, Lithuania, Portugal, Ireland, Slovakia, Estonia, and Bulgaria), less than five percent in five countries (Iceland, Netherlands, Luxembourg, Austria, and Norway), and fairly high (7.6-10 percent) or intermediate (5.1-7.5 percent) in the remaining twelve countries.

Table 1. Unemployment rates in 25 European countries, 2010-2013.

	2010	2011	2012	2013	Trend†	2010-13‡
Spain	17.8	19.2	22.5	23.8	+	20.8
Latvia	17.4	14.6	13.6	10.7	-	14.1
Lithuania	16.1	13.9	12.2	10.9	-	13.3
Portugal	10.5	11.3	13.9	14.7	+	12.6
Ireland	12.0	12.9	12.9	11.6	=	12.4
Slovakia	12.5	11.8	12.2	12.5	=	12.3
Estonia	14.9	11.2	8.9	7.6	-	10.7
Bulgaria	9.2	10.1	11.0	11.8	+	10.5
Hungary	10.0	9.9	9.7	8.9	=/-	9.6
Cyprus	5.1	6.4	10.2	13.6	+	8.8
Poland	8.1	8.0	8.5	8.8	=/+	8.4
Italy	6.9	6.9	8.9	10.2	+	8.2
France	7.7	7.7	8.2	8.7	=/+	8.1
Slovenia	6.5	7.5	7.9	9.2	+	7.8
Belgium	7.0	6.0	6.4	7.1	=	6.6
Finland	6.6	6.1	6.1	6.5	=	6.3
Denmark	6.3	6.3	6.3	5.9	=	6.2
Czech Republic	6.4	5.9	6.0	6.1	=	6.1
U.K.	5.8	5.8	5.7	5.4	=	5.7
Malta	5.6	5.0	4.9	5.2	=	5.2
Iceland	5.8	5.5	4.5	4.3	-	5.0
Netherlands	3.9	4.0	4.7	6.1	+	4.7
Luxembourg	3.8	4.1	4.2	5.1	=/+	4.3
Austria	4.1	3.9	4.2	4.7	=/+	4.2
Norway	2.7	2.4	2.3	2.6	=	2.5

Notes † Unemployment trend: + (growing), - (falling), = (stable).
‡ Average unemployment rate for the years 2010-2013.
Source: Eurostat (2016a).
EU-SILC 2013 longitudinal data not available for Croatia, Germany, Greece, Romania, Sweden and Switzerland.

Also relevant for our purpose is the combination of *trend* and *level* in unemployment (Table 2). If the 'economic climate' (i.e. trend in unemployment) is important, the unemployment experience may be less harmful in countries where the economy is improving. The following analyses will therefore compare countries with high and rising unemployment

(Spain, Portugal and Bulgaria) to countries with high and falling unemployment (Latvia, Lithuania and Estonia).

Table 2. Classification of 25 European countries according to average level of and change in unemployment rates 2010-2013.

Unemployment 'case'	Countries
High and growing	Spain, Portugal, Bulgaria
High	Ireland, Slovakia
High and falling	Latvia, Lithuania, Estonia
Fairly high and growing	Cyprus, Italy, Slovenia
Fairly high	Hungary, Poland, France
Intermediate	Belgium, Finland, Denmark, Czech Republic, U.K., Malta
Low (and fluctuating)	Iceland, Netherlands, Luxembourg, Austria, Norway
Notes	High = > 10 percent, Fairly high = 7.6-10 percent, Intermediate = 5.1-7.5 percent, Low = < 5.1 percent

Survey data

The 25 countries were selected for this study since EU-SILC panel data 2010-2013 were available. The advantage of panel data is well-known; observations on the same individuals at different time points facilitate causal analyses. Moreover, unemployment rates changed considerably in many European countries during 2010—2013, implying that many respondents analyzed here experienced diverging macroeconomic conditions.

More unfortunate aspects of the EU-SILC data is that the panel is *short* (people are followed for maximum four years) and the samples are *unbalanced* in the sense that analyzed respondents vary as to how many surveys they have participated in. The EU-SILC panel data are collected with a rotational method. A new sample of households/persons is introduced each year to replace roughly 25 percent of the existing panel (Verma, Betti and Gagliardi, 2010:p.15). In the sample analyzed here, some respondents have participated in only two

surveys, while others have participated three or four years. Hence, the short and unbalanced panel restricts the number of within-individual changes on both health and employment.

Respondents aged 18-65 have been analyzed. Number of respondents and person-years (overall and by employment status) in each country are given in Table A1 in the Appendix. The analyzed samples consist of respondents who were either in employment, or outside employment, but in the labor force and actively defining themselves as unemployed. Excluded are individuals who were not asked health questions, and people who reported being disabled, retired, inactive, students, in military service, or having domestic tasks as their main activity, in any of the panel waves. The rationale for this is the assumption that the employed will be the most relevant 'control group' when estimating health effects of unemployment (cf. Roelfs et al., 2011:p.850). One objection could be that this may overstate health effects of unemployment, since continuously employed people could be positively selected on health characteristics. As this is a possibility, analyses were also run without excluding the disabled, retired, inactive, etc., but findings were very similar (available on request).

Variables

The outcome measure is *self-rated general health* (SRH), with response categories 'very bad', 'bad', 'fair', 'good' and 'very good', coded 0-4 (higher values indicate better health). Two versions were used; the *level* of SRH was indicated by the last available observation, and *change in* SRH was indicated by subtracting the last available SRH observation from the first (cf. Böckerman and Ilmakunnas, 2009:p.172). Thus, if SRH was good (3) in 2011, but bad (1) in 2013, the change score is -2. This change score provides a *difference-in-difference* estimate (Guo and Fraser, 2015:p.298), enabling a comparison of *trends* in self-rated health between unemployed and employed.

Self-rated health is widely used in research as a general health indicator (e.g. Präg et al., 2013; Huijts and Kraaykamp, 2012). Although simple, it captures both differences in mortality risk (Mackenbach et al., 2002) and in overall health status between employed and unemployed (Tøge and Blekesaune, 2015). It is associated with functional limitations, chronic disease, and minor psychological and psychiatric conditions (Singh-Manoux et al., 2006; Präg et al., 2013). As it reflects respondents' self-perceived fitness and psychosocial well-being (Blaxter, 2005:p.53-54), it will probably be a sensitive indicator of how stress and feelings of inadequacy and exclusion, due to unemployment, could affect health.

A set of explanatory and control variables are used in the analyses. *Being unemployed* is derived from a question on current economic status (unemployed = 1, employed = 0). The variable *becoming unemployed* signifies change from employment to unemployment in the past year (becoming unemployed = 1, else = 0). *Gender* is measured by a dummy variable for women (=1). *Age* is coded into five categories (16-25, 26-35, 36-45, 46-55 and 56-65 years), with 36-45 years as reference. A dummy variable for being *married* (yes = 1) is included. Education is measured by a question on highest attained educational level and classified into *primary* (pre-primary, primary and lower secondary), *secondary* (upper secondary and post-secondary non-tertiary), and *higher education*, the latter being the reference category. *Years in paid employment* (and its square) measures labor market experience and indicates the extent of previous unemployment, while dummy variables for *part-time work*, having a *temporary work contract*, and being *self-employed*, were included to account for differences in work conditions.

Table A2 in the Appendix shows descriptive statistics for the country samples, split by employment status. In all 25 countries, the unemployed were less likely to hold higher education and to be married. In all countries except Finland, Netherlands and Slovenia, the unemployed were significantly younger.

Regression techniques

The central interest of this paper is whether unemployment 'makes a difference' for people's self-rated health. Thus, the aim is to shed light on the possible *causal effect* of being or becoming unemployed. The well-known difficulty when investigating this question is that the unemployed and the employed will typically differ on multiple characteristics, such as previous health trajectories, educational level and work history (i.e. selection bias).

Initially, we present *ordinary least square regression (OLS)* analyses, which describe the overall association between self-rated health (SRH) and employment status. OLS regression has difficulties in estimating causal effects, however, because unobserved confounders are not taken into account. Since self-rated health is measured at least two times, we can estimate *individual-level fixed effects* (FE) models, implying adjustment for unobserved *time-invariant* personal characteristics (e.g. ability) (Allison, 2009; Morgan and Winship, 2010). However, FE models have difficulties as well because the panels are short and unbalanced, implying little 'room' for within-individual change over time. We will therefore also utilize *propensity score matching* (PSM) (Morgan and Winship, 2010:p.87-122). As regression techniques are well known, we focus on describing propensity score matching in the following.

Propensity score matching

It is impossible to know what the health of an unemployed individual would have been if *the same* individual had remained employed; this is the so-called 'fundamental problem of causal inference' (Holland, 1986). Propensity score matching (PSM) is one proposed solution. The propensity score is defined as the *probability of treatment assignment*, conditional on observed baseline covariates (Rosenbaum and Rubin, 1983) – in our context, 'treatment' will

refer to being or becoming unemployed. In PSM, the matching procedure consists in comparing 'treated cases' (unemployed) and 'control cases' (employed) who are similar on their propensity scores, estimated from observed characteristics (χ). If χ completely accounts for all the important differences between treated and non-treated, conditioning on χ should yield a credible estimation of the causal effect (Morgan and Winship, 2010:p.94). However, unmeasured covariates may still affect both outcome and assignment to treatment (Rosenbaum and Rubin, 1984), but if χ is correlated with the important covariates not included in χ, the procedure should give results fairly close to the unbiased causal effect.

The first step in propensity score matching is to estimate propensity scores for each individual in the sample, i.e. the probability of unemployment. Table 3 lists the covariates used for propensity score estimations by means of logistic regression (Angrist and Pischke, 2009:p.83). As the goal is to estimate the probability of *treatment assignment*, we include covariates known to be associated with unemployment (Austin, 2011a). All covariates are measured at *individual* baseline (i.e. the first observational year for the included individuals). The predicted propensity scores are used for 'balancing' the data. Table A3 in the Appendix shows that the balancing procedure has eliminated all significant differences between 'treated' and 'controls', except for a slight difference in mean age in Hungary.

Table 3. List of variables included in the propensity score analysis.

Covariates	Two educational level dummies (higher education omitted), five age dummies (36-45 years omitted), gender, marital status, years in paid employment, years in paid employment squared, part-time work, temporary work contract, self-employed, bad health, LLSI
Treatment	Unemployed (being or becoming)
Outcome	Self-rated health (level and change)

The second step in PSM is choosing which controls (employed) that should be matched to the treated (unemployed). Different 'algorithms' exist for choosing and weighting matches in the comparison procedure (Morgan and Harding, 2006:p.30-33). We will primarily report results from *kernel* matching, estimated with the following equation:

$$ATET = \frac{1}{N^T} \sum_{i \in T} \left\{ Y_i^T - \sum_{j \in C} Y_j^C K\left(\frac{e_j(x) - e_i(x)}{h_n}\right) / \sum_{k \in C} K\left(\frac{e_k(x) - e_i(x)}{h_n}\right) \right\}$$

ATET is the average treatment effect for the treated, N^T is the number of treatment cases, $Y$is self-rated health (level or change), *i* is an index of treatment cases, and *j* is an index of control cases. $e_j(x)$ is the propensity score of case *j* in the control group, $e_i(x)$ is the propensity score of case *i* in the treated group, and $e_j(x) - e_i(x)$ is the distance of the propensity scores (Li, 2013:p.204). In kernel matching, all untreated respondents are used as matches, but each untreated is weighted (denoted K) according to how close his/her propensity score is to the matched treated individual. How differences in propensity scores translate into weights are determined by the 'bandwidth' parameter (denoted h_n), in our case set to 0.02. Bootstrapped standard errors (100 replications) are reported throughout. As a sensitivity test, we used the

nearest neighbor algorithm as well (with four matches per treated individual). These results were basically similar to the kernel results, and are presented in Table A4 in the Appendix[2].

Analyses and interpretation

The analyses are performed separately for the 25 countries. The OLS results indicate the overall unemployed—employed health differential, adjusted for gender, age, marital status and education. OLS estimates may capture health effects of long-term unemployment (e.g. respondents who lost their job before 2010). However, as estimates of short-term effects of job loss, they may be contaminated because of reverse causation (i.e. people with ill health are more prone to unemployment). The FE models are better from a causal inference perspective, because all time-invariant personal characteristics are accounted for. The (potential) difference between OLS and FE results may also be informative as to why unemployment effects could vary with the country-level unemployment rate. If *less stigma/self-blame* is the 'mechanism', there should be smaller coefficients in high-unemployment countries in both OLS and FE models. The *compositional change* explanation, on the other hand, would receive support if health effects of unemployment vary as a function of the unemployment rate in OLS models, but not in FE models; if the composition of the unemployment population is essential, then we should see less cross-national variation when we account for selection bias.

Similar reasoning applies to the PSM analysis, and to (potential) difference in results between models using *being* and *becoming* unemployed as 'treatment'. With the former treatment variable, long-term unemployed people (who became unemployed in the early parts of the crisis and probably are more 'negatively selected') are included. When treatment is changed to *becoming* unemployed instead, people who lost their job during the study period are analyzed, and these individuals are therefore exposed to the economic conditions prevailing in 2010—2013. Again, if the *less stigma/self-blame* explanation is valid, there

should be considerable cross-national difference in results in both model specifications. However, if there is less country-level variation in the *becoming* unemployed model (which accounts for more selection bias by excluding the long-term unemployed), the *compositional changes* explanation is supported.

Lastly, we apply PSM *difference-in-difference* models, using the *change* in SRH between first and last available observation as the outcome. The diff-in-diff[3] analysis with *becoming* unemployed as treatment is the best specification from a causal inference perspective, because it both balances the samples on observed covariates, controls for time-invariant personal characteristics, and constrains unemployment occurrences to 2010—2013. However, as the EU-SILC panel is short and unbalanced (with few individual-level changes), it is necessary to supplement the diff-in-diff analysis with results from 'naïve' models that use the data more efficiently. We believe that PSM analysis with *becoming* unemployed as treatment and *SRH level* as outcome is best suited to these data. However, results are reported from the various model specifications to facilitate comparisons.

Monte Carlo simulations suggest that minimum 25 countries is required in order to retrieve reliable and precise country-level estimates in linear multilevel regression models (Bryan and Jenkins, 2016:p.19). The number of countries included in this study is therefore (barely) large enough, but we have chosen a *graphical representation* of the country-level variance instead of a formal statistical hypothesis test (Bowers and Drake, 2005). Using a visual technique allows for a more accurate description of the cross-national variation than a simple country-level coefficient derived from a multilevel regression model.

Results

OLS and FE models

Table 4 presents results from ordinary least square (OLS) and fixed effects (FE) regressions, both with standard errors clustered on individuals. The countries are listed according to average unemployment rates in 2010-2013 (see Table 1). The OLS results, adjusted for a number of covariates, indicate significantly worse self-rated health among the unemployed in all 25 countries, in line with hypothesis 1. However, the unemployed—employed health differential is often quite small, varying from -0.085 (Malta) to -0.588 (Austria) (self-rated health is measured on a five-point scale: 0-4). Regarding hypothesis 2, that SRH differences between employed and unemployed will vary with unemployment rates, the marked differences in several low-unemployment countries (e.g. Luxembourg and Norway) should be noted. In the eight countries with highest average unemployment rate, the average OLS coefficient was -0.162, while the corresponding average coefficient for the five countries with lowest average unemployment rate was -0.389.

Results from the FE models[4] are reported in the right part of Table 4. Compared to the OLS results, the coefficient is reduced considerably in many countries (e.g. Finland, U.K. and Luxembourg). It is nonetheless noteworthy that the coefficient is *negative* in 21 of the 25 countries. Thus, detrimental health effects of unemployment also appear when accounting for time-invariant personal characteristics, in line with hypothesis 1. However, the FE coefficients are significant (on the five percent level) in only 11 countries, and the effect size is usually very small, the exceptions being Malta (-0.112) and Norway (-0.221).

Table 4. Results from ordinary least square (OLS) and individual level fixed effects (FE) regression of self-rated health (SRH), by unemployment and covariates.

	(1) OLS	(2) FE
Spain	-0.125*** (0.010)	-0.040*** (0.015)
Latvia	-0.154*** (0.015)	-0.047** (0.019)
Lithuania	-0.168*** (0.023)	-0.015 (0.030)
Portugal	-0.168*** (0.019)	-0.063*** (0.022)
Ireland	-0.159*** (0.022)	-0.024 (0.034)
Slovakia	-0.176*** (0.024)	-0.053** (0.023)
Estonia	-0.193*** (0.023)	-0.012 (0.027)
Bulgaria	-0.156*** (0.019)	-0.071*** (0.022)
Hungary	-0.285*** (0.016)	-0.048*** (0.018)
Cyprus	-0.119*** (0.019)	-0.089*** (0.026)
Poland	-0.154*** (0.016)	-0.075*** (0.016)
Italy	-0.132*** (0.012)	-0.064*** (0.018)
France	-0.182*** (0.017)	-0.032* (0.018)
Slovenia	-0.321*** (0.029)	-0.062* (0.036)
Belgium	-0.383*** (0.031)	-0.079* (0.041)
Finland	-0.272*** (0.029)	0.010 (0.031)
Denmark	-0.429*** (0.070)	0.077 (0.058)
Czech Republic	-0.353*** (0.032)	-0.069* (0.036)
U.K.	-0.287*** (0.026)	-0.013 (0.037)
Malta	-0.085** (0.035)	-0.112** (0.049)
Iceland	-0.170** (0.074)	0.003 (0.079)
Netherlands	-0.286*** (0.037)	0.043 (0.036)
Luxembourg	-0.399*** (0.044)	-0.038 (0.054)
Austria	-0.588*** (0.039)	-0.079* (0.041)
Norway	-0.504*** (0.075)	-0.221*** (0.079)
Significance level	*** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1	
Covariates	(1) OLS: Gender dummy, marital status dummy, two educational level dummies (ref.: higher educ.), and four age dummies (ref.: 36-45 years). (2) FE: calendar year dummies.	
Notes	Standard errors clustered at the individual for both OLS and FE models. Only unemployment coefficients shown. Full models available on request. Number of observations in appendix (table A1).	

With respect to hypothesis 2: the average FE coefficient in the eight high-unemployment countries was quite small (-0.041) and very similar to the average for the five low-unemployment countries (-0.058). When excluding the 'outlier' Norway, the average coefficient for low-unemployment countries declined to -0.018 – slightly *lower* than the average in the high-employment countries. Thus, the FE results do not indicate that unemployment hurts less when it is widely shared.

An improving economy could makes it easier to cope with unemployment (hypothesis 3). A comparison between the 'high and growing' (Spain, Portugal, and Bulgaria), and 'high and falling' (Latvia, Lithuania, and Estonia) countries addresses this issue. Conclusions are problematic as coefficients are quite small (and often insignificant), but the coefficients in the former ('high and growing') group (-0.040, -0.063, -0.071) suggest somewhat more negative health effects than the coefficients in the latter group (-0.047, -0.015, -0.012).

The differences between OLS and FE results may, as argued above, suggest what 'mechanisms' are involved, and these differences point in favor of the *changed composition* 'mechanism': clear differences between high- and low unemployment countries appear in the OLS models, but these differences are practically eliminated in the FE models where selection bias is less of a problem.

Propensity score matching estimates

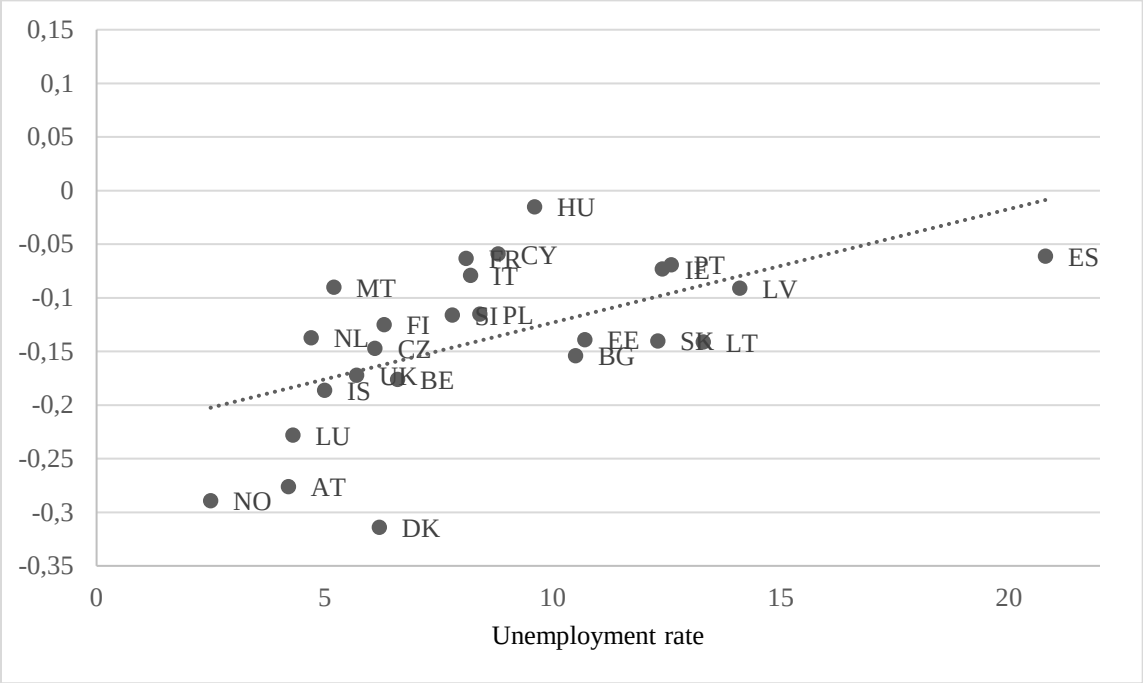
Propensity score matching (PSM) results are presented in Table 5, for *being* unemployed in the two left columns and *becoming* unemployed in the two columns on the right. Both *level* of and *change* in self-rated health (SRH) are used as outcomes.

Table 5. Average treatment effect among the treated of (1) being or (2) becoming unemployed on self-rated health in 25 European countries. Results from kernel matching.

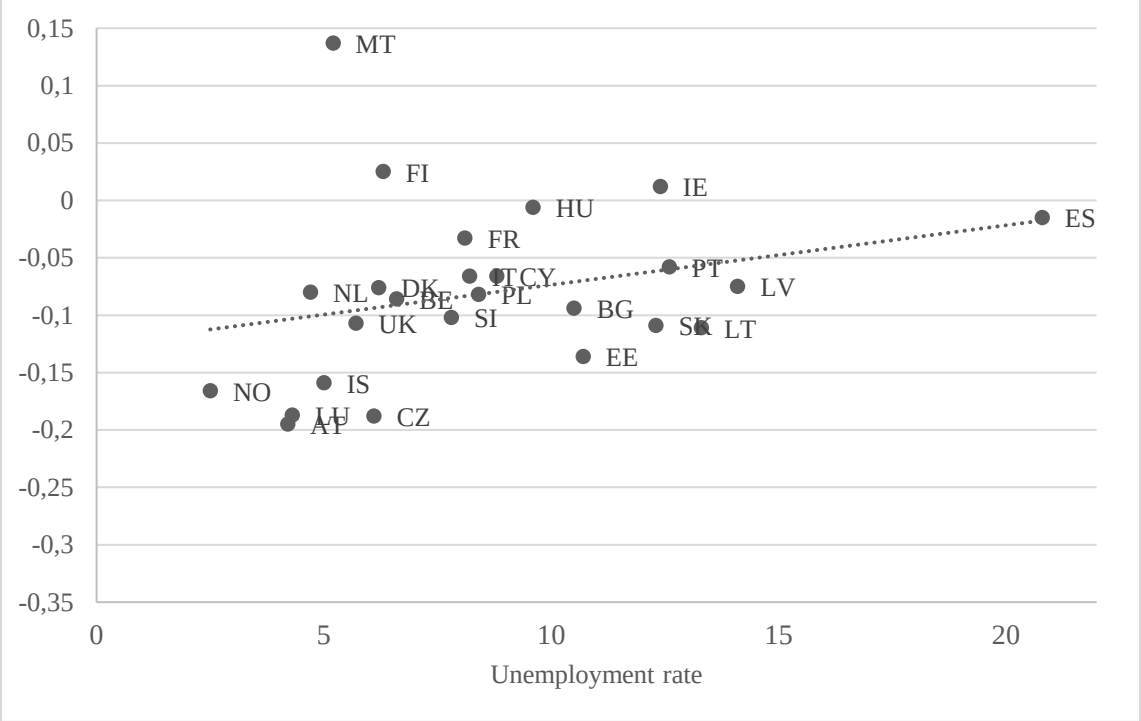
	(1) Being unemployed		(2) Becoming unemployed	
	Outcome		Outcome	
	SRH	SRH change	SRH	SRH change
Spain	-0.061*** (0.021)	-0.031 (0.021)	-0.015 (0.022)	0.029 (0.027)
Latvia	-0.091*** (0.017)	-0.034* (0.018)	-0.075*** (0.024)	-0.047* (0.025)
Lithuania	-0.141*** (0.023)	-0.063*** (0.022)	-0.111*** (0.027)	0.080** (0.031)
Portugal	-0.069*** (0.021)	-0.034* (0.020)	-0.058** (0.025)	-0.043* (0.023)
Ireland	-0.073*** (0.026)	-0.033 (0.027)	0.012 (0.035)	0.005 (0.040)
Slovakia	-0.140*** (0.022)	-0.061** (0.026)	-0.109*** (0.038)	-0.038 (0.029)
Estonia	-0.139*** (0.023)	-0.065*** (0.022)	-0.136*** (0.031)	-0.055** (0.027)
Bulgaria	-0.154*** (0.021)	-0.056*** (0.018)	-0.094*** (0.026)	-0.042 (0.030)
Hungary	-0.015 (0.022)	-0.037 (0.023)	-0.006 (0.025)	-0.033 (0.027)
Cyprus	-0.059* (0.033)	-0.032 (0.035)	-0.066** (0.031)	-0.041 (0.035)
Poland	-0.115*** (0.013)	-0.051*** (0.014)	-0.082*** (0.020)	-0.035** (0.017)
Italy	-0.079*** (0.013)	-0.036*** (0.013)	-0.066*** (0.019)	-0.018 (0.024)
France	-0.063*** (0.018)	-0.006 (0.018)	-0.033 (0.020)	0.011 (0.021)
Slovenia	-0.116*** (0.029)	-0.041 (0.029)	-0.102** (0.041)	-0.049 (0.037)
Belgium	-0.176*** (0.038)	-0.050 (0.031)	-0.086* (0.048)	-0.039 (0.048)
Finland	-0.125*** (0.035)	-0.038 (0.030)	0.025 (0.064)	-0.015 (0.065)
Denmark	-0.314*** (0.067)	-0.084 (0.064)	-0.076 (0.064)	0.030 (0.050)
Czech Republic	-0.147*** (0.028)	-0.048 (0.031)	-0.188*** (0.035)	-0.052 (0.035)
U.K.	-0.172*** (0.030)	-0.037 (0.025)	-0.107*** (0.032)	-0.027 (0.034)
Malta	-0.090** (0.040)	-0.083 (0.052)	0.137** (0.060)	0.111 (0.082)
Iceland	-0.186*** (0.070)	-0.191*** (0.072)	-0.159 (0.118)	-0.080 (0.114)
Netherlands	-0.137*** (0.037)	0.022 (0.040)	-0.080 (0.051)	0.064 (0.043)
Luxembourg	-0.228*** (0.042)	-0.067 (0.046)	-0.187*** (0.061)	-0.026 (0.052)
Austria	-0.276*** (0.034)	-0.106*** (0.034)	-0.195*** (0.042)	-0.028 (0.035)
Norway	-0.289*** (0.060)	-0.005 (0.062)	-0.166 (0.101)	0.018 (0.088)
Notes	Significance levels: *** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1			
	Bootstrapped standard errors (100 replications) in parenthesis.			
	Bandwidth = 0.02.			

Figure 1. Average treatment effect of being (A) or becoming (B) unemployed on self-rated health in 25 European countries. Results derived from kernel matching.

Panel A. Being unemployed



Panel B. Becoming unemployed



This approach indicates that *being* unemployed is related to significantly worse self-rated health[5] in 23 countries, the exceptions being Hungary (-0.015) and Cyprus (-0.059). As regards hypothesis 2, results indicate that the average coefficient in the eight countries with high overall unemployment was -0.109, but approximately twice as large (-0.223) in the five low-unemployment countries. This pattern is also evident in Figure 1, panel A. As to hypothesis 3 ('economic climate'), coefficients for Spain, Portugal, and Bulgaria (-0.061, -0.069, -0.154) compared to Latvia, Lithuania, and Estonia (-0.091, -0.141, -0.139) reveal no noteworthy tendency.

There are even indications of negative health effects when we look at SRH *change* (i.e. the diff-in-diff analysis). The coefficient is negative in 24 of 25 countries, but, except for Iceland and Austria, effect sizes are usually very small and significant in only eight countries. As regards *becoming* unemployed, the effect on SRH tends to diminish somewhat (but not in the Czech Republic). The coefficient is negative in 22 countries, but significant in only 14. With respect to hypothesis 2, panel B in Figure 1 shows that in many countries, the treatment effects fluctuate around -0.100, with a very slight tendency for less health effects in high unemployment countries. This is also evident from the average coefficients for the eight high-unemployment (-0.073) versus the five low-unemployment (-0.157) countries. No evidence in favor of hypothesis 3 emerges, however, as Latvia, Lithuania and Estonia (-0.075, -0.111, -0.094) have larger coefficients than Spain, Portugal and Bulgaria (-0.015, -0.058, -0.094).

In the column to the very right, the diff-in-diff analysis for *becoming* unemployed is presented. Only two coefficients are both negative and statistically significant: Latvia (-0.047) and Estonia (-0.055). The coefficients were negative in 17 countries, but of a very small size, again suggesting effects in the expected direction, but rather marginal changes.

Finally, a comparison of panel A and panel B in figure 1 is interesting with respect to explanatory 'mechanisms'. As discussed earlier, cross-national variation should be smaller in

the *being unemployed* specification if *compositional change* is the 'dominating' explanation. This is what emerges from the data, where the plotted line is clearly less steep in panel B than in panel A. In other words, unemployment does apparently not hurt less when it is widely shared; a changed composition of the unemployment population seems more decisive.

Discussion

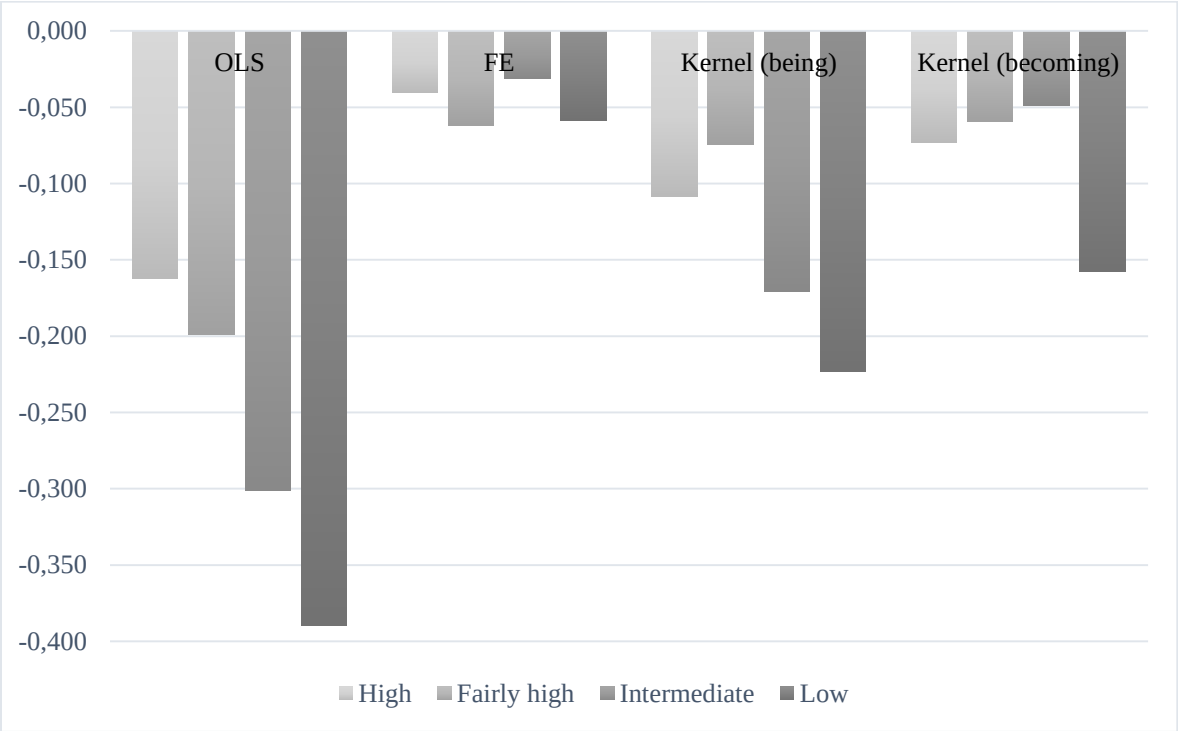
The three hypotheses

Overall, the results are in line with hypothesis 1 that negative effects of unemployment on self-rated health seem to occur practically everywhere, regardless of overall macroeconomic conditions. According to the OLS findings, the unemployed reported significantly worse self-rated health than the employed throughout Europe. Although the effect size was reduced considerably in the FE models, negative coefficients occurred in 21 of 25 countries, among which 11 were statistically significant (significant results in 16 countries on the 10 percent level). Propensity score matching indicated similar widespread (although small) negative consequences both when using *being* and *becoming* unemployed as 'treatment'. However, the difference-in-difference analysis gave less evidence of negative health effects, perhaps because of few within-individual changes in the data. In summary, hypothesis 1 is supported, but not unconditionally; effect sizes were often small, suggesting only marginal negative, short-term, health effects of unemployment in many countries.

The empirical support for hypothesis 2 – that negative health effects of unemployment will be smaller when unemployment rates are higher – appears less convincing. The OLS results suggested such differences between high-unemployment and low-unemployment countries, while the FE results did not. However, to some extent, propensity score matching (PSM) results were in line with the OLS results since some tendencies towards more negative health effects in low-unemployment countries occurred. Figure 2 summarizes the main

findings. Differences in effect sizes were mostly negligible between countries with a high, fairly high, or intermediate unemployment level. The low-unemployment countries, however, showed an interesting tendency towards more negative effects of unemployment than the other countries.

Figure 2. The relationship between unemployment and self-rated health for countries with a high, fairly high, intermediate and low unemployment level. Average coefficients derived from OLS regression, individual level FE models, and kernel matching.



Note: Countries classified according to average unemployment rate 2010-2013, see table 1.

Hypothesis 3, suggesting that the unemployment experience would be more harmful when unemployment was high and growing compared to high and falling, received scant support, and a reasonable conclusion is to reject this hypothesis.

The empirical results may suggest which mechanisms are vital for the relationship between unemployment and health in economic up- and downturns. *Re-employment difficulties* are probably of little importance in the short-term, since there were trivial differences in results between countries with growing and falling unemployment rates. Moreover, variations in *stigma/self-blame* are probably not of great importance either,

because then we would expect that health effects of unemployment would vary more as a function of the country-level unemployment rate[6]. The finding that low-unemployment countries stand somewhat out empirically, suggests *compositional changes* as an important mechanism. In countries with markedly lower unemployment rates, selective processes in the labor market could contribute to a population of unemployed who has less satisfactory health and less coping resources available. Furthermore, the diverging results between the different models specifications seem to support the *compositional changes* explanation as well: Cross-national variations in results were considerably smaller in models which account for larger parts of the possible selection bias (FE and PSM with *becoming* unemployed as outcomes) than in the more 'naïve' models (OLS and PSM with *being* unemployed as outcome).

Limitations

The summary of the results should be considered in light of various limitations in the present study. Due to unbalanced panel data of relatively short duration, only short-term health effects of unemployment could be analyzed. Moreover, some results are uncertain since they are based on relatively few within-individual changes. Using several EU-SILC panels, instead of being restricted to the 2010-2013 data, might both extend the study period and increase the number of analyzed events. However, because of the rotational data collection method we are not able to localize (and statistically adjust for) the individuals who contribute with information in several panels, which would constitute an additional source for bias.

A second serious limitation concerns the possible discrepancy between the country-level unemployment rate and the actual experience of the unemployment situation among the unemployed in his/her local area. Several arguments in the present study (e.g. less stigma/self-blame) are based on the assumption that a high country-level unemployment rate usually means that unemployment is a common phenomenon among the respondent's friends,

relatives, and neighbors. This neglects that there are considerable geographical variations in unemployment rates in many European countries. However, there are limited possibilities for dividing each national sample into regional subsamples with the EU-SILC data. The interpretations in this study therefore depend on the somewhat uncertain assumption that a high (or rising) national unemployment rate will be observed and experienced directly by most respondents.

Other limitations should also be noted. Although the matching procedure seems to be successful, omitted variable bias is still a concern – unobserved cognitive abilities or certain personality characteristics could be important for both the probability of exposure to unemployment and to how well a person deals with the experience[7]. Negative effects of unemployment would be difficult to find if the analyzed outcome, self-rated health, tends to be stable and unchanging in the short-term. If effects are driven by psychological factors, however, a more rapid impact may arise. A potential problem with the treatment measurement (i.e. being or becoming unemployed) is that the exact duration of unemployment cannot be determined in the analyzed data. Furthermore, since most analyses have been based on comparisons between employed and unemployed, there is a possibility that negative health effects are underestimated if the employed as well experience deteriorated health during an economic downturn, for instance due to stress and fear of job loss. Lastly, it should be emphasized that health effects of unemployment could be shaped by institutional settings and welfare state arrangements, but these factors have not been examined in the present study. In passing, however, it can be noted that negative unemployment effects on self-rated health do not seem to be particularly small in countries with well-developed 'safety nets' such as the Nordic countries Denmark, Iceland and Norway.

Conclusions

Unemployment tends to hurt self-rated health across European countries, whatever the macroeconomic conditions. Ordinary least square regression models indicate that the unemployed are in worse health than the employed throughout Europe. The association is reduced considerably, however, but remains nevertheless significant in several countries, when time-invariant personal characteristics are accounted for by means of individual-level fixed effects models. Propensity score kernel matching shows that both being and becoming unemployed is associated with worse self-rated health in the short run, although effect sizes are often quite marginal. The analyses indicate a slight tendency towards less health effects of unemployment in countries where the experience is widely shared, but the main pattern is cross-national similarity. However, countries with very low unemployment rates seem to have more marked employed—unemployed health differences, suggesting that *the composition* of the unemployed population is quite influential in explaining cross-national differences in health effects of unemployment.

Notes

[1] Negative health effects of unemployment during economic downturns may be concentrated among people in vulnerable labor market positions, but inconsistent findings are reported (Charles and DeCicca, 2008; Clark, Knabe and Rätzel, 2010).

[2] Nearest neighbor matching was performed with replacement (Xie, Brand and Jann, 2012). The range of available matches was restricted by a caliper of 0.01, which corresponds roughly to a width equal to 0.2 of the standard deviation of the propensity score logit (Austin, 2011b). Compared with the kernel method, nearest neighbor matching indicated somewhat more negative health effects of *being* unemployed in France, but less in Cyprus, Malta, Slovenia, and United Kingdom. More health effects of *becoming* unemployed were found in Hungary, but less in Netherlands and Malta.

[3] Note that the FE and PSM diff-in-diff models are likely to yield differing results, even though both procedures rely on within-individual change in SRH. This is so because the latter use matched employed people (whose health can improve) as a control group, whereas the former use the unemployed individual before he/she lost his/her job as a control group.

[4] Only calendar year dummy variables are included in the FE models. The results were similar when potentially time-varying covariates (e.g. marital status and income) were included.

[5] Gender-specific analyses gave very similar effects for men and women in 18 countries; since gender differences seem small, they are not reported here.

[6] This does not imply that stigma/self-blame or re-employment difficulties are irrelevant on the individual level, only that they do not explain cross-national differences in the association.

[7] This possibility is of less concern in diff-in-diff analyses where trends in within-person health developments are compared between treated and control subjects.

Funding

This work was supported by the Research Council of Norway [grant number 221037].

Acknowledgments

The present paper is a part of the project "Health Inequalities, Economic Crisis, and the Welfare State". Earlier versions were presented at the conference "The welfare state and health inequalities during an economic downturn" in Oslo 26.05.2016, and at the European Society for Health and Medical Sociology's biannual conference in Genève 29.06.2016. We thank for comments from Jason Beckfield, Espen Dahl, Tim Huijts, Trond Petersen, Kjetil van der Wel, and participants at these seminars. We also thank the three anonymous reviewers for important criticism and valuable suggestions.

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Appendix

Table A1. Number of individuals and person-years for 25 European countries in 2013, overall, and by employment status (source: EU-SILC panel data 2013).

	Overall		Employed		Unemployed	
	Individuals	**Person-years**	**Individuals**	**Person-years**	**Individuals**	**Person-years**
Spain	15 638	35 014	12 139	25 939	5662	9071
Latvia	7044	16 369	5949	13 069	2131	3300
Lithuania	4726	11 278	4089	9569	1016	1709
Portugal	6370	15 932	5314	12 696	1921	3230
Ireland	4942	9979	3991	7949	1312	2028
Slovakia	6648	17 079	5967	15 005	1222	2074
Estonia	5533	11 445	4915	9919	1055	1526
Bulgaria	5874	15 138	4901	12 089	1600	3049
Hungary	12 466	28 850	11 067	24 788	2672	4062
Cyprus	6478	15 817	5775	13 538	1532	2279
Poland	14 672	35 381	12 982	30 585	2945	4796
Italy	21 179	44 053	18 270	37 323	4469	6730
France	15 745	42 062	14 502	37 698	2677	4361
Slovenia	5394	11 779	4593	9824	1259	1952
Belgium	6535	14 389	5868	12 797	1003	1584
Finland	6459	15 061	5931	13 579	951	1482
Denmark	2044	5269	1972	4943	203	281
Czech Republic	6590	15 316	6155	14 063	798	1253
U.K.	13 448	24 140	12 660	22 700	1172	1426
Malta	4466	10 751	4233	10 148	381	603
Iceland	1611	3763	1540	3552	155	208
Netherlands	6362	15 052	6154	14 471	451	561
Luxemburg	4985	10 904	4722	10 167	533	737
Austria	6537	14 813	6146	13 733	764	1080
Norway	3848	8669	3734	8416	190	234

Notes
Only participants answering health questions are included in the sample.
Individuals with missing information on health variables were dropped.
Only people in the labor force included (disabled, retired, inactive, students, in military service, and fulfilling domestic tasks are dropped).
People over 65 and under 18 years are excluded from the sample.

Table A2. Descriptive statistics on selected covariates, by employment status.

	Higher education (%)		Mean age		Married (%)		Woman (%)	
	Emp.	**Unemp.**	**Emp.**	**Unemp.**	**Emp.**	**Unemp.**	**Emp.**	**Unemp.**
Spain	38.21	19.90***	43.52	40.59***	62.92	48.29***	44.78	47.96***
Latvia	32.78	12.59***	43.29	41.74***	49.30	34.48***	53.58	43.79***
Lithuania	39.88	14.04***	46.25	44.14***	72.77	53.72***	56.93	46.93***
Portugal	18.50	9.05***	42.92	41.06***	63.25	47.99***	49.53	49.85
Ireland	52.37	29.39***	41.87	39.05***	61.31	40.25***	48.66	29.34***
Slovakia	25.40	10.82***	41.90	37.20***	61.85	40.52***	48.10	50.34*
Estonia	36.47	16.20***	43.65	40.66***	50.71	34.86***	55.63	43.97***
Bulgaria	28.01	9.81***	43.80	40.62***	63.36	47.88***	48.12	42.05***
Hungary	25.00	7.25***	42.72	39.29***	56.45	37.84***	48.33	47.24
Cyprus	37.66	31.55***	41.95	37.64***	71.62	51.95***	50.07	46.16***
Poland	26.19	9.95***	41.71	39.35***	72.11	54.30***	45.90	53.86***
Italy	19.37	10.88***	43.42	37.59***	59.58	37.24***	42.79	42.33
France	37.17	19.58***	42.45	38.85***	52.64	33.35***	48.76	49.05
Slovenia	32.38	13.24***	41.75	41.85	54.47	44.98***	48.59	49.85
Belgium	47.56	20.89***	42.14	41.61*	54.25	37.14***	48.16	49.31
Finland	45.06	19.94***	45.06	45.71**	55.69	34.89***	46.52	37.65***
Denmark	43.95	26.47***	47.22	46.08*	68.44	50.18***	48.82	51.25
Czech Republic	19.50	5.12***	43.86	42.39***	59.79	44.37***	50.30	56.42***
U.K.	44.19	25.13***	42.99	38.11***	58.41	29.17***	48.99	41.87***
Malta	22.57	5.47***	39.80	35.31***	59.25	29.52***	36.82	25.87***
Iceland	35.68	17.31***	45.00	38.05***	57.79	37.81***	48.56	40.38**
Netherlands	43.17	30.98***	44.54	45.90***	54.75	36.90***	49.51	48.48
Luxembourg	28.27	15.04***	41.09	36.56***	57.06	32.84***	45.48	46.27
Austria	23.30	9.72***	41.75	40.48***	54.28	36.67***	46.36	47.41
Norway	45.91	23.14***	44.27	37.22***	52.38	29.06***	44.33	38.89*

Notes Pooled data. Full descriptive statistics available on request.

T-test on the difference between unemployed and employed.

Significance levels: *** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1

Table A3. Covariate balancing, derived from kernel matching (treatment = being unemployed, outcome = SRH level).

	Higher education (%)		Mean age		Married (%)		Woman (%)	
	Treated	Control	Treated	Control	Treated	Control	Treated	Control
Spain	26.40	26.78	41.69	41.37	58.29	57.76	43.55	43.45
Latvia	14.20	14.32	42.82	42.76	38.32	38.60	46.56	46.35
Lithuania	16.41	16.75	44.66	44.85	61.23	61.48	47.15	46.75
Portugal	8.99	8.30	42.47	42.46	54.19	54.86	50.54	50.04
Ireland	31.62	31.80	40.90	41.17	45.06	45.93	32.21	31.58
Slovakia	9.73	10.34	41.91	41.52	55.47	54.63	51.70	52.31
Estonia	19.64	20.25	42.29	42.22	41.54	41.73	45.06	45.83
Bulgaria	10.82	10.64	44.01	44.05	57.24	56.53	42.93	42.35
Hungary	5.52	6.07	41.04	42.42***	42.54	42.39	48.30	47.97
Cyprus	27.64	28.31	41.32	40.91	68.84	66.99	41.20	42.37
Poland	10.33	10.48	41.03	40.90	61.70	60.86	53.21	52.94
Italy	11.02	10.70	39.54	39.52	44.08	44.08	46.44	46.25
France	21.83	22.70	39.33	39.60	36.09	36.88	50.61	50.50
Slovenia	13.86	14.93	44.34	44.32	51.19	52.24	48.81	49.15
Belgium	22.26	22.52	41.84	41.51	40.66	41.09	49.75	49.46
Finland	23.50	25.04	46.98	46.75	37.75	38.35	39.74	40.02
Denmark	24.56	25.58	47.01	46.75	56.14	58.30	49.12	49.57
Czech Republic	5.81	7.19	43.35	43.45	49.86	50.50	57.79	57.54
U.K.	28.45	30.44	40.95	40.95	33.17	36.27	42.49	43.04
Malta	6.69	9.17	38.26	38.67	37.01	39.93	30.32	31.15
Iceland	17.52	21.04	38.56	39.10	37.23	37.70	40.15	40.77
Netherlands	28.01	29.67	47.59	47.16	41.18	42.93	47.90	48.86
Luxembourg	13.90	15.63	39.26	38.83	41.12	41.17	48.88	48.76
Austria	10.69	11.91	40.63	40.52	39.74	41.96	47.69	47.74
Norway	23.08	24.56	36.82	37.51	26.92	31.67	39.56	39.38

Notes T-test on the difference between treated and control subjects.

Significance levels: *** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1

Table A4. Average treatment effect among the treated of (1) being or (2) becoming unemployed on self-rated health in 25 European countries. Results from nearest neighbor caliper matching.

	(1) Being unemployed		(2) Becoming unemployed	
	Outcome		Outcome	
	SRH	SRH change	SRH	SRH change
Spain	-0.058** (0.023)	-0.041* (0.024)	-0.035 (0.027)	-0.016 (0.027)
Latvia	-0.066*** (0.019)	0.007 (0.024)	-0.074*** (0.025)	-0.016 (0.027)
Lithuania	-0.078*** (0.030)	-0.007 (0.026)	-0.073** (0.036)	-0.022 (0.036)
Portugal	-0.072*** (0.026)	-0.006 (0.023)	-0.075*** (0.028)	-0.014 (0.030)
Ireland	-0.069** (0.029)	0.018 (0.031)	-0.010 (0.041)	0.055 (0.042)
Slovakia	-0.137*** (0.027)	-0.042 (0.027)	-0.077** (0.038)	-0.004 (0.036)
Estonia	-0.156*** (0.031)	-0.023 (0.027)	-0.134*** (0.037)	-0.054* (0.031)
Bulgaria	-0.135*** (0.023)	-0.029 (0.023)	-0.089*** (0.029)	-0.002 (0.028)
Hungary	-0.055** (0.028)	-0.027 (0.024)	-0.034 (0.034)	-0.044 (0.031)
Cyprus	-0.015 (0.039)	0.008 (0.039)	-0.013 (0.035)	0.019 (0.041)
Poland	-0.088*** (0.024)	-0.013 (0.018)	-0.079*** (0.022)	-0.007 (0.021)
Italy	-0.071*** (0.015)	0.008 (0.021)	-0.072*** (0.026)	0.032 (0.027)
France	-0.052** (0.022)	-0.004 (0.023)	-0.055** (0.026)	-0.006 (0.025)
Slovenia	-0.135*** (0.036)	-0.046 (0.034)	-0.035 (0.052)	-0.012 (0.049)
Belgium	-0.141*** (0.039)	-0.051 (0.032)	-0.040 (0.057)	0.009 (0.043)
Finland	-0.117*** (0.040)	-0.019 (0.034)	0.010 (0.073)	0.034 (0.070)
Denmark	-0.266*** (0.070)	-0.081 (0.070)	-0.083 (0.074)	-0.034 (0.061)
Czech Republic	-0.142*** (0.037)	-0.031 (0.031)	-0.161*** (0.045)	-0.050 (0.041)
U.K.	-0.145*** (0.037)	-0.027 (0.034)	-0.096* (0.052)	0.011 (0.045)
Malta	-0.043 (0.054)	-0.041 (0.071)	0.065 (0.072)	-0.074 (0.087)
Iceland	-0.153** (0.071)	-0.113 (0.086)	0.050 (0.109)	-0.021 (0.111)
Netherlands	-0.098* (0.051)	0.052 (0.045)	0.037 (0.057)	0.134*** (0.050)
Luxembourg	-0.192*** (0.054)	-0.037 (0.047)	-0.156** (0.066)	-0.027 (0.066)
Austria	-0.218*** (0.042)	-0.061 (0.044)	-0.164*** (0.045)	0.006 (0.036)
Norway	-0.336*** (0.084)	-0.081 (0.062)	-0.183 (0.112)	-0.063 (0.103)
Notes	Significance levels: *** = 0.01 ** = 0.05 * = 0.1 NS/(empty) = > 0.1			
	Bootstrapped standard errors (100 replications) in parenthesis.			
	Caliper = 0.01 (four neighbours).			