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The causal effect of job insecurity on health

Study based on a sample of the elderly from 20 different European countries

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Summary

Many studies have found evidence for associations between increased job insecurity and deterioration of different health aspects. Only few studies attempted to uncover the real causal effect of job insecurity on health. By conducting an instrumental variable approach, using Employment Protection Legislation indicators as instruments, this study tries to estimate the actual causal effect of this relation. Data from the Survey of Health, Aging and Retirement in Europe is used to examine this relation for individuals ranging between the age of 40 and 70 from 20 different European countries. Contradicting existing literature, mainly by Caroli and Godard (2016), this study finds a causal effect of job insecurity for eight out of nine examined health indicators. Only showing no significant causal effect for self-perceived health. Results show that coefficients from causal effects are substantially larger than coefficients based on associations, indicating that the effect is more profound than previous research implies. Additionally, this study examines heterogeneous groups, finding differences for gender and marital status. However, no substantial differences between age groups are found. Overall, the results from this study have serious implications for labour market related policy advice. Policy makers need to take into account that job insecurity deteriorates health when examining welfare effects of labour market related policies.

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1. Introduction

In recent periods, dynamics on the labour market have changed. Employees stay for a shorter period with the same employer and change jobs more often (Givord and Maurin, 2004). Also, relatively more employees are working in the context of temporal contracts relatively to permanent contracts (Van der Meer, 2016). The great recession is one of the main events that caused organisations to restructure, downsize and merge, which has led to the rise of lay-offs and temporal job contracts (Sverke et al., 2002). Also, more structural trends, like technological developments and globalisation, caused labour market dynamics to change (Van der Meer, 2016).

This increase in labour market dynamics is causing increased job insecurity among employees (Hartley et al., 1991: Lau & Knardhal, 2008). Job insecurity can be defined as: *"An overall concern about the continued existence of one's job in the future"* (Sverke et al., 2002:243). Stiglitz (2011) states that job flexibility should not only concern economic growth in the sense of Gross Domestic Product (GDP), but also concern economic stability and job quality, since both are very important for the well-being of citizens. Therefore, this thesis focusses on the effect of job insecurity on different health dimensions, which is examined through an empirical study on a population of individuals between the age of 40 and 70 in 20 European countries.

There already exists broad literature on the effect of unemployment on health, causing increased morbidity, heart diseases, mental health problems etc. (Eliason & Storrie, 2009; Deb et al., 2011). However, less is known about the effects of job insecurity. While the actual time that someone is unemployed is on average relatively low in a life time, the experience of job insecurity is more widespread (Caroli & Godard, 2016). Some studies show that job insecurity might even be more damaging than unemployment itself (Aronsson, 1999). Researchers found that job insecurity is associated with different aspects of health, like chronic heart diseases, somatic, lower self-percieved health, different types of mental health problems etc. (Ferrie et al., 1995; Aronsson, 1999; De Witte, 1999; Sverke et al., 2002; Cheng et al., 2005; Lau, 2008; Burgard et al., 2009; Mandal et al., 2011; Van der Meer, 2016).

However, most relations found between job insecurity and health are based on mere associations (De Witte, 1999; Sverke et al., 2002; Cheng et al., 2005; Burgard et al., 2009;

Mandal et al., 2011; Van der Meer, 2016). Research on the effect of job insecurity that has uncovered a causal effect is very limited. This is due to the possibility of endogeneity in the relation of job insecurity and health that may arise from simultaneity, or in other words reversed causality, and omitted variables (Caroli & Godard, 2016). Firstly, with regard to reversed causality, job insecurity may affect health, but health may also have a negative effect on job insecurity (Caroli & Godard, 2016). Secondly, the relation might reflect some unmeasured 'third variables', for instance, pessimism, causing biased estimates, since pessimistic individuals report higher job insecurity as well as lower health status (Caroli & Godard, 2016).

Addressing endogeneity is important when results are used for labour market related policy advice. The first who tried to address this problem are Ferrie et al. (1995), who used the exogenous shock of privatization of a specific government agency to address the problem of endogeneity. However, as mentioned by Caroli and Godard (2016), this privatization is related to major organisational changes, that are also related to job insecurity, and therefore could not be seen as exogenous. Caroli and Godard (2016) use an instrumental variable approach with Employment Protection Legislation (EPL) interacted with industry specific dismissal rates as an instrument. Caroli and Godard (2016) find that, in comparison to their standard probit models, only the effect of job insecurity on increased health problems regarding headaches, eyestrain and skin problems remain significant from a wide variety of examined health factors.

However, Caroli and Godard (2016) use the European Working Conditions Survey and only examine men with permanent contracts. Selecting only this specific group raises suspicion for remaining endogeneity. It is most likely that individuals with a permanent contract have specific characteristics that also affect job insecurity and their health in contrast to individuals with temporal contracts. This study contributes to the literature by conducting a comparable instrumental variable approach without selecting on endogenous variables and tries to identify the real causal effect. In contrast to Caroli and Godard (2016), this study uses the Survey of Health, Aging and Retirement in Europe (SHARE) dataset and also includes women and individuals with temporal contracts in the sample. The SHARE dataset consist only of older individuals and therefore the sample only consist of employed individuals between the age 40 and 70. The data also stems from the years 2004-2015, providing the possibility to use panel data and covering different time periods than existing literature.

Using data that varies across time makes it possible to use instrumental variables that also vary over time. Caroli and Godard (2016) interact EPL with actual dismissal rates to address the problem that EPL, as an instrument on its own, has a too limited variability to count as a relevant instrument. To utilize the time varying data, this study only uses EPL indicators for temporal and permanent contracts as an instrumental variable, without interacting with actual dismissal rates for specific industries. Working in specific industries could also be correlated with health and therefore be endogenous.

Lastly, most of the research on this relation is only focussing on specific health dimensions, like physical health, mental health, and subjective health (Aronsson, 1999; De Witte, 1999; Sverke et al., 2002; Cheng et al., 2005; László et al., 2010; Mandal et al., 2011; Van der Meer, 2016). Only research conducted by Ferrie et al. (1995) and Caroli and Godard (2016) examine and compare different health dimensions. Since the SHARE dataset focusses specifically on health, a variety of health indicators is available for analysing and comparing different health dimensions.

The contribution of this master thesis to the literature is threefold, since it consists of a combination of uncovering the actual causal effect of job insecurity on health, extending the sample with women and individuals with temporal contracts and focuses the analysis on different health dimensions. Overall, other studies miss at least one of these three aspects. Additionally, this study examines differences between heterogeneous groups, differentiating on gender, marital status and age. Differences between men and women are especially interesting, since Caroli and Godard (2016) only examine men. Existing literature also examined differences between similar groups (De Witte, 1999; Cheng e.a, 2005; Laszlo et al., 2010). However, all differences are examined trough association instead of causal relations. All aspects described above results in the following research question:

To what extent has job insecurity a causal effect on mental, physical and subjective health of individuals in Europe between the age of 40 and 70, and to what extent are there any differences between health dimensions and heterogeneous groups?

A deteriorating effect of job insecurity on different health dimensions is of societal interest, since increased job insecurity can impose costs on society. If individuals experience job insecurity due to increasing unstable work environment and labour market dynamics,

deterioration of health could lead to, for example, unemployment or burn outs. Society will, mainly in countries with high levels of social security, pay for these events trough unemployment or disability benefits (Schaufeli, 2016). Moreover, job insecurity is a phenomenon that is not dealt with by colleagues, employers or unions. The social environment does not have a stress-buffering effect with regard to job insecurity (Dekker & Schaufeli, 1995). This has serious implications for labour market related policies, like those focussed on the relative increase of temporal labour market contracts (OECD, 2015).

This study gives policy makers insight to what extent there is an actual causal relation between job insecurity and health, which gives them the opportunity to base policy advice on estimated causal effects instead of mere associations. It also gives citizens insight in the extent to which job insecurity influences their health. This insight gives them the opportunity to judge current regulation on labour contracts from different governments within Europe and gives them the possibility to reflect on their labour market status in relation to their health.

This study starts with providing a theoretical framework, in which theories on the effect of job insecurity on health are discussed that eventually result in different hypotheses. The following chapter describes the empirical methodology and robustness checks conducted by this study. In the data section the data sources are described, variables are defined and descriptive statistics are presented. The successive chapter presents the results and a corresponding analysis. Followed by the last chapter consisting of a conclusion and discussion.

2. Theoretical framework

This chapter starts with a brief discussion on different factors that cause job insecurity. Followed by a discussion on the conceptualisation of job insecurity and different mechanisms that theoretically describe the way job insecurity affects different health dimensions. Finally, hypotheses are discussed regarding the effect of job insecurity for the general population and heterogeneous groups.

2.1 Macroeconomic conditions

Van der Meer et al. (2016) state that there are broad economic trends that led to the increase of job insecurity. Technological developments, like robotics and internet, caused jobs to disappear from the labour market. Jobs occupied by workers with a low educational level are now replaced with jobs for higher educated workers due to technology, shifting the demand from low to high educated workers (Brynjolfsson & McAfee, 2014). Another economic trend that affects labour market dynamics is, according to Van der Meer et al. (2016), globalisation. Internationally oriented labour markets cause, for example, labour market migration that, in some countries, has a downward pressure on wages (Rodrik, 1998). When, for example, East-European workers are executing the same job for significantly lower wages than native West-European workers. Moreover, Cheng et al. (2005) describe that in recent periods the recession caused firms to down-size and restructure which led to mergers, acquisitions and bankruptcy of various firms. These actions, taken under worsened economic conditions, caused unemployment to rise. Rising unemployment increases fear for job loss in the near future. Take note that data is gathered between the years 2004 and 2015 and therefore partially consist of data gathered before the great recession.

2.2 Labour market dynamics

A couple of decades ago, Doeringer and Piore (1971) already found that firms that were known for having a life-long lasting career were declining. Cappelli (1999) and Givord & Maurin (2004) found that long lasting relationships between employer and employee were decreasing. In more recent studies, Van der Meer et al. (2016) claim that workers are staying in the same job for a shorter period than before. All studies taken together show that labour markets have been changing, which resulted in increased labour market dynamics. This trend is visible in almost all countries within the OECD that experienced an increase of temporal labour market contracts between the years 2006 and 2012 (OECD, 2015). This increase in labour market dynamics is found to have an effect on job insecurity among employees (Hartley et al., 1991: Lau & Knardhal, 2008).

2.3 Job insecurity

Job insecurity, in this thesis defined as an overall concern about the continued existence of one's job in the future, is according to many scientific studies, found to be negatively correlated with health (Sverke, 2002). One important note is that there is a clear distinction between job insecurity and poor working conditions, which is often confused in the literature (Lau & Knardhal, 2008). A different discussion in the literature focusses on the effects of working conditions on health. This relation is mainly focussed on aspects like the workload of an employee, the extent to which an individual feels like they are in control of their own job and tasks, social support on the work floor etc. (Cheng .e.a 2005; Lau & Knardhal, 2008). Although these aspects are also relevant in the context of the well-being of the employee and its assumed relationship with health, this is not considered as job insecurity. Job insecurity only focusses on potential job loss and its related consequences.

Moreover, the concept of job insecurity is ambiguously described in the literature. Two conceptualizations, namely job insecurity only relating to the current job and job insecurity in general, need to be differentiated. As Sverke (2002) describes job insecurity as a 'general concern' about the existence of one's job, this conceptualisation looks at a broad concern of an individual's potential job loss. Other studies conceptualize job insecurity as the perception of an individual on the likelihood of potential job loss in the near future, which only focusses on the current job (Lau, 2008; Caroli & Godard, 2016). Both conceptualisations look similar at first sight, but there is a nuanced distinction that has to be made. Aspects that are, for example, related to subjects like employability and unemployment benefits also affect a general concern about future job loss. It is most likely that an individual that has great prospects of finding a new job after job loss, is less concerned about the continued existence of its job (Green, 2002). However, this is not the case if the concept of job insecurity is only about the perception on the chance of potential job loss in the near future. It is not expected that the chance of potential job loss is directly affected by employability or unemployment benefits, as is the case when the definition entails an overall concern about potential job loss.

As already shown in the definition, this thesis looks at job insecurity in the general sense. The question in the SHARE questionnaire is also specified for the more general conceptualisation of job insecurity, as is described in the data section. It is important to note that Caroli and Godard (2016) use a different conceptualisation of job insecurity, by only looking at risk of potential job loss in the near future.

2.4 Mechanisms

Van der Meer et al. (2016) state that risk aversion is one of the mechanisms leading job insecurity to deterioration of health. Increased job insecurity increases the perception of increased risk of potential job loss. The experience of increased risk is assumed to reduce well-being and to cause stress, which is related to various mental, physical and subjective health problems. Research shows that increased levels of the hormone cortisol were found with people that experience job insecurity, which is known for causing stress. Persisting high levels of stress hormones have a negative effect on mental health (Van der Meer et al., 2016). Cheng et al. (2005) state that the working mechanism is based on anxiety stemming from job insecurity. In this sense, increased job insecurity causes fear for future job loss, having consequences like loss of income and status. Ferrie et al. (2002) add to this that anxiety or fear is probable of affecting an individual's dietary intake, causing them to eat less healthy food, drink more alcohol, or change the volume of food consumed. This change of diet could affect the physical health of individuals with increased job insecurity.

Green (2011) describes that job insecurity works as a stressor that leads to job strains. The main factor causing deterioration of health is the loss of control over one's job and life. Job insecurity could also lead to a change in power relation and psychological contract between employer and employee, which on their turn could affect the mental health of an individual (Scott, 2004; Mauno et al., 2005). Green (2011) also describes a difference between a personal psychological effect and an economic effect. The personal psychological effect of job insecurity focusses on the job loss itself and the consequences it has for the individual, like loss of status, self-efficacy and colleagues. The economic effect of job insecurity focusses on the loss of income that will be the consequence of job loss. One of the important factors that, according to Green (2011), mediates this economic effect of job insecurity in general, is the employability of the person in question. If this individual thinks that he or she will easily find a new job after job loss, the economic effect is expected to be lower. This could also apply to countries with, for example, more generous unemployment insurance.

2.5 Main hypothesis

The literature consists of a broad variety of associations found between job insecurity and different health dimensions (De Witte, 1999; Sverke et al., 2002; Mandal et al., 2011; Cheng et al., 2005; Burgard et al., 2009; Van der Meer, 2016). It is not the main focus of this thesis to test these associations found in previous research, but to examine the actual causal effect. Researchers found associations between mental, physical and subjective health, with the main

focus on mental health problems. However, Caroli and Godard (2016) found that, with integrating a model for causal interpretation, only a few health dimensions were really affected by job insecurity. Caroli and Godard (2016) state that the association between job insecurity and health is most likely based on the reversed effect, namely bad health causing increased job insecurity or on unobserved "third factors" such as pessimism. The main hypothesis, that is the red thread through this thesis, tests to what extent associations that are found in the literature still hold after using statistical models that show results that can be interpreted as causal. However, Caroli and Godard (2016) did still find some causal effects that were all specific physical health problems, namely eye-strain, headaches and skin problems (Caroli & Godard, 2016). This study tries contribute to the literature by providing improved causal estimates of the effect of job insecurity on health. The following hypothesis is based on previous research of which the exogeneity of the relation remains doubtful.

H1: With the exception of specific physical health aspects, there is no causal effect of job insecurity on different health dimensions.

2.6 Heterogeneous effects

Additionally, this study examines differences between heterogeneous groups. Existing literature examined differences between these groups by conducting analyses based on association. As this study extends this analysis with causality, it gives new insights in differences between heterogeneous groups. As earlier studies already examined this, theoretical propositions for differences between these groups are firstly discussed, followed by a hypothesis concerning these differences.

2.6.1 Gender

Ferrie et al. (1995) and Laszlo et al. (2010) find, in contrast to other researchers, a larger association for women than for men. The theoretical argumentation behind this is that women tend to have more temporal contracts and are more vulnerable due to discrimination (Laszlo et al., 2010). However, other researchers found a larger association for men than for women (De Witte, 1999; Cheng et al., 2005; van der Meer et al., 2016). Men are assumed to have a different role in society, since they are still, to some extent, expected to be the main actor in the family that works and provides income (De Witte, 1999; Cheng, 2005). Moreover, men work in business cycles that are more sensitive to changing economic conditions (van der Meer et al, 2016). The relatively higher expectations and sensitive business cycles cause men to react more heavily to job insecurity resulting in more increased health problems. The

following hypothesis is based on the results of previous studies that, in most cases, found larger association for men than for women.

H2: The effect of job insecurity on health is larger for men than for women.

Examining differences between men and women has an important contribution to the results of this study, since Caroli & Gogard (2016) only examine effects for men. Potential deviating results found in this study could be partially explained by differences between men and women. If for instance, women experience larger effects of job insecurity on health, results found by Caroli & Gogard (2016) are underestimated, compared to effects for the total population.

2.6.2 Marital status

Less is known about differences between married and unmarried individuals. Laszlo et al. (2010) and De Witte (1999) found no significant differences between both groups. However, it is still interesting to examine differences between both groups, since previous results are only based on associations. According to Laszlo et al. (2010), marital status could decrease the economic effects of job insecurity, since a married individual could experience financial support from their spouse. However, the literature does not take into account that this could also lead to a reversed effect. Married individuals need to provide income for more individuals, like kids, when, for example, the spouse is unemployed. Based on previous results and contradicting theoretical propositions, there is no reason to suspect that there is a difference between both groups. This leads to the following hypothesis:

H3: There is no difference between the effect of job insecurity on health for married and unmarried individuals.

2.6.3 Age

Many studies examined differences between age groups. Despite the fact that this study only examines the effect of individuals between the age of 40 and 70, differences between age groups still yield some interesting insights. Job insecurity could have different effects for individuals that are still in an important period of their career, in contrast to individuals that are at the end of their career. De Witte (1999) states that individuals in the middle of their working life experience more negative effects from job insecurity, since job loss will have a larger impact on their career and on their economic situation due to differences in household composition and financial situation. However, individuals that are becoming unemployed during earlier periods in their working life have a higher chance of becoming re-employed.

When, for example, individuals from above the age of 60 become unemployed their chances of re-employment are relatively low (Laszlo et al., 2010). De Witte (1999) and Laszlo et al. (2010) did not find any significant differences between age groups. In contrast to both, this study will examine the differences between the age groups 40-55 and 55-70. For the former, job insecurity is more likely to affect health trough career consequences and the latter will be more affected through fear for unemployment due to low re-employment probabilities. Based on these theoretical propositions no difference can be expected, leading to the following hypothesis:

H4: There is no difference in the effect of job insecurity on health between the age group 40-55 and 55-70.

3. Methods

The first part of this chapter consists of a description of different empirical methodologies. Followed by the description of different robustness checks.

3.1 Probit and instrumental variable models

This thesis uses two different models to provide an answer for its hypotheses, namely a (ordered) probit model and an (ordered) probit with instrumental variable approach. The results of both models are compared to analyse the difference between associations and causal effects for the relation between job insecurity and different health dimensions. Since most of the dependent variables are of binary or ordinal scale, probit or ordered probit models are used respectively, to take into account that these variables are nonlinear. Stata 14.0 is used to conduct all the analyses and the conditional mixed-process (CMP) module is used to estimate different probit models (Roodman, 2011).

Similar to other research, the results from an ordered probit model can only be seen as association between independent and dependent variable. The equation of the standard ordered probit model of this study is as follows:

$$HEALTH^*_{ict} = \gamma JOBINS_{\text{ict}} + X_{ict}\beta_1 + D_t\beta_2 + D_c\beta_3 + \mu_{\text{ict}} \quad (1)$$

In this equation, $HEALTH^*_{ict}$ denotes the latent variable for the level of health of an individual i in country c and wave t that is:

$$HEALTH_{ict} = \begin{cases} 1 \; if \;\; HEALTH^*_{ict} \;\; \leq \alpha_1 \\ 2 \; if \; HEALTH^*_{ict} \;\; \alpha_1 < \; HEALTH^*_{ict} \leq \; \alpha_2 \\ . \\ . \\ J \; if \; HEALTH^*_{ict} \; > \; \alpha_{J-1} \end{cases} \quad (2)$$

The unknown cutoffs satisfy the condition that $\alpha_1 < \alpha_2 < \ldots < \alpha_{J-1}$. $JOBINS_{ict}$ denotes the perceived job insecurity of individual i in country c and wave t. X_{ict} is a vector of individual characteristics of an individual from country c in wave t. D_t and D_c are vectors of wave dummies and country dummies and μ_{ict} is the error term. To overcome the problem of endogeneity, the following two equations are jointly estimated:

$$HEALTH^*_{ict} = \gamma JOBINS_{\text{ict}} + X_{ict}\beta_1 + D_t\beta_2 + D_c\beta_3 + \mu_{\text{ict}} \quad (3)$$

$$\text{JOBINS}_{\text{ict}} = \delta_1 EPLTEMP_{ct} + \delta_2 EPLPERM_{ct} + X_{ict}\theta_1 + D_t\theta_2 + D_c\theta_3 + \varepsilon_{ict} \quad (4)$$

$JOBINS_{ict}$ is the latent level of perceived job insecurity and $HEALTH^{*}_{ict}$ is the same variable as described in the first equation. $EPLTEMP_{ct}$ denotes the level of stringency of EPL for temporal contracts in country c and at the time of wave t. $EPLPERM_{ct}$ is the EPL indicator for permanent contracts and has the same specifications.

This model mainly deals with two problems concerning causal interpretation of the results. Firstly, it deals with the possibility of reversed causality between job insecurity and different dimensions of health. It is likely that there is not only an effect from job insecurity on health, but also an effect of health on job insecurity. One can argue that someone with bad health is more likely to report higher job insecurity, because health problems could increase the likelihood of unemployment. Instrumenting causes the effect to only run from the instrumental variable, through the independent variable to the dependent variable, meaning that the effect could only run in one direction dealing with the possibility of reversed causality. Secondly, the instrumental variable approach deals with the fact that the independent variable is not randomly assigned and the effect of the independent variable is possibly affected by other variables that also have an effect on the dependent variable. By instrumenting job insecurity with the stringency of EPL, this method deals with endogeneity.

This study uses two types of Employment Protection Legislation (EPL) indicators of OECD countries as instruments (OECD, 2013). EPL for permanent and EPL for temporal contracts are used that each consist of eight different specifications that together determine the stringency of the EPL in a specific country. The specifications of these indicators are described in the data section. For these instruments to be valid and relevant, three conditions have to be met (Angrist & Pischke, 2014). The first condition concerns the relevance of the instrument, meaning that the instrument should have a significant and substantial effect on the independent variable, which is shown in chapter 5. The second condition is the exclusion restriction, stating that the instrument is not allowed to have an independent effect on the dependent variable. In other words, the effect of the instrument on the dependent variable should only run through the independent variable. In this particular case the assumption is that EPL does not have a direct effect on individual's health and that this effect only runs through job insecurity to health. The third condition states that the instrument is independent and not correlated with other variables within the model. The assumption in this case is that EPL is a macro level variable that is to some extent randomly generated and not correlated with characteristics of the individual on the micro level.

A comparable instrumental variable approach is also used by Caroli and Godard (2016). However, the main difference is that Caroli and Godard (2016) interact EPL with actual rate of dismissals for specific sectors. One of the limitations of this approach is the probability that individuals can self-select into these sectors for health related reasons. This study excludes this possibility by using two different EPL indicators within a longer timeframe to use the variation of EPL over time to increase variability. Caroli and Godard (2016) describe that EPL is a strong instrument and is assumed to be exogenous only when individuals do not self-select into countries for reasons related to EPL that are correlated with health, which is highly unlikely. In addition, country dummies are included in all models to address the problem that EPL indicators would capture all heterogeneity between countries.

3.2 Marginal effects

Coefficients stemming from (ordered) probit models are hard to compare, since these coefficients correspond to binary and ordinal variables with different scales and different meanings. Therefore, a marginal effects analysis is conducted. For each scale of the binary or ordinal variable, marginal effects calculates the difference in chance that an individual is in a specific scale for each unit increase in job insecurity. In other words, when the level of job insecurity increases by one unit, the marginal effect calculates to what extent the chance that an individual is in a specific scale of the dependent variable is increased or decreased by a specified number of percentage points. This method is important since it opens up the possibility to compare the magnitude of the results between models. In this way, this study examines to what extent the effect of job insecurity on different health dimensions is larger or smaller with instrumental variable models compared to standard probit models.

3.3 Robustness checks

To increase the probability that results are trustworthy, this study conducts different robustness checks described in the paragraphs below.

3.2.1 Standard errors

An (ordered) probit model would assume that each observation is an independent individual. However, with panel data this assumption is not met. To partially account for this, the error terms are clustered on the individual level. Another way to address this problem is by using random effects that takes into account an individual specific error term. However, when using CMP, this is hard to estimate. To still partially address this problems, random effects are tested for one model with a specific health measure and one model with a general health

measure. This test shows that there are no major differences for these models when random effects are included (results not shown).

3.2.2 Sensitivity analysis

To check whether the effect of job insecurity on health is sensitive to differences between the scales measured by the variable job insecurity, the same models are estimated by using a binary variable instead of an ordinal variable. Running this sensitivity analysis shows to what extent the results are robust. A dummy variable is used that is one for individuals that experience job insecurity and zero if individuals do not experience job insecurity. Results of this analysis are briefly discussed in the results section (chapter 5.4) and presented in appendix A.

4. Data

4.1 SHARE data

This research uses micro data from the Survey of Health, Aging and Retirement in Europe (SHARE) that consist of six waves from 21 different countries. Only 20 countries are included in the sample, since data stemming from Croatia did not contain data on job insecurity. Respondents from the SHARE dataset are mostly above the age of 50. However, this study uses all observations from employed individuals between the age of 40 and 70 to increase the total number of observations. Originally, only individuals above the age of 50 are interviewed, which are randomly selected. However, also partners are interviewed and some specifications are described on the household level.

Respondents from SHARE, and their partners, answer questions on different subjects like, employment, health, retirement and social-economic status. A professional from the SHARE institute interviews each respondent, since a significant part of the sample is assumed to have problems answering the questions on their own. The interviewers use the Computer Assisted Personal Interviewing (CAPI) methodology, consisting of face-to-face interviews combined with a laptop, which makes it possible to conduct real-time physical tests (SHARE release guide, 2018).

Currently the SHARE dataset consist of six waves. The third wave only consists of data that are irrelevant for this specific thesis, therefore only five waves are included. These waves range between the year 2004 and 2015 and the specific years for gathering data for each wave and each country are specified in appendix B. Job insecurity is only observed for employed individuals and therefore only employed individuals are observed. When an individual is employed in wave one and unemployed in wave two and four, this individual is only observed during employment, meaning that this individual is only observed in wave one.

4.2 Variables

To measure job insecurity, respondents answered the question "*My job security is poor*". The measure from the SHARE dataset is based on a four-point Likert scale that goes from 1= Strongly agree to 4= Strongly disagree. However, for reasons of clearer interpretation the variable is inverted to 1= Strongly disagree to 4= Strongly agree. In this case, an increase in the measure shows an increase in job insecurity. For the sensitivity analysis, a dummy variable is constructed that is one for respondents that agreed or strongly agreed to the statement: "*My job security is poor*".

This study uses a range of different variables to measure the dependent variable health. A distinction is made between broad and specific health measures. The first broad measure is the United States version of the Self-Perceived Health (SPH) measure that is common in the literature. Respondents are asked how they judge their own health in general, on a five-point Likert scale ranging from 1= poor to 5= excellent. The second broad measure is a semi-objective and physical health measure, in which respondents are asked to report their number of chronic diseases. The third measure is the Europe Depression (EUROD) scale, which is a mental health measure combining different specific mental health measures in one variable. Measures that are incorporated in the EUROD scale are related to depression, loneliness, guilt, fatigue etc. The scales range from 0= not depressed to 12= very depressed. The fourth measure is the limitations with activities of daily living (ADL) variable, which is a dummy variable that is one if someone experiences limitations with performing daily activities, like dressing and showering.

Furthermore, to make the results more comparable with other research regarding the effect of job insecurity on health, this research also analyses more specific health measures. With the first three measures, respondents are asked if they use drugs for a specific physical disease, namely coronary diseases, blood cholesterol and joint pain. All variables are dummy variables that are one when the respondent uses drugs for that specific physical disease. Drugs measures are used due to the fact that these measures remained part of the SHARE questionnaire over six waves. Measures that focused on respondents actually having the disease instead of using drugs for that specific disease were dropped from the questionnaire after wave two. These measures can be biased, since individuals that do not use drugs, while in fact having one of these diseases are represented by the wrong value. However, on the other hand it can be assumed that when someone uses drugs, which are most likely prescribed by a doctor, this individual is more likely to actually have this disease which could decrease response bias. The last two measures are specific mental health measures on two different topics, namely fatigue and depression. Dummy variables are used, that are one if the respondent has one of these mental health problems.

Take note that using different types of health measures to represent health has methodological consequences. Some of the measures are subjective and therefore have the potential to be biased. All individuals are asked their opinion on specific health aspects. This subjective interpretation could make comparability between individuals problematic (Bound, 1989). Still, the measure self-perceived health is seen as a good indicator for health since it is a

significant predictor of future functioning and mortality within countries (Doorslaer & Gerdtham, 2003; Frijters et al., 2005). Also semi-objective health measures are used, like the number of chronic diseases. The number of chronic diseases variable is to some extent objective. However, individuals can still report this number differently due to their perception. Moreover, fully objective health measures could also be biased since the actual measure could not be fully correlated with the health aspect it is trying to measure (Bound, 1989). Interpretation of results in respect to different types of health measures should be done with caution.

4.3 EPL indicators

One of the instrumental variables used in this research is the employment protection legislation (EPL) indicator for permanent contracts EPR_V1, from the OECD (OECD, 2013). This measure consist of eight different topics related to employment protection of regular contracts consisting of three categories. The first category is procedural inconveniences, which covers items about provision and notification procedures. The second category is notification and severance payments that consist of legal requirements on the length of notice period and the extent to which a dismissed worker receives severance payments. The last topic covers the difficulty of dismissals and contains the definition of unfair dismissal and regulation, like typical compensation after 20 years, years in a job and the possibility of reinstatement after unfair dismissal (Myant & Branhuber, 2016).

The second instrument is the EPL indicator for temporal contracts EPT_V1 (OECD, 2013). The indicator is divided in two categories, namely regulation for fixed-term contracts and regulation for temporary work agencies. The former looks at how many times a contract can be extended before it is obligatory to provide permanent contracts. The latter looks at what kind of work is legally applicable for temporary work agencies, the maximum duration of contracts and how many contract extensions are legal. One topic looks at the difference in payment between fixed term contracts and temporary work agencies (Myant & Branhuber, 2016).

Both variables range from zero to six, with six meaning that a country has very stringent EPL. However, since data on EPL is only available until 2013 and data from the last SHARE wave is gathered until 2015, both EPL variables are extended. Extending this variable is necessary for increasing the number of observations within the sample. Therefore, the value of the OECD indicator for countries in the year 2013 is also used in the year 2015. This assumption

is based on the argument that EPL remains stable within short time periods, three years for example. This is also shown in appendix C in which the variation of EPL over time and per country is shown (OECD, 2013). A sensitivity analysis is conducted to check whether this assumption makes a substantial differences, by testing the same models without wave six (shown in appendix E). Take note that values of EPL are not differentiated for individuals with temporal and permanent contracts. Myant & Branhuber (2016) state that EPL for both subgroups overlaps to some extent and cannot be seen as completely different. Both types of EPL can affect the same individual in different ways, despite this individual having a temporal or a permanent contract.

Other variables included in the models are control variables, of which a part consists of dummy variables for gender and marital status. Individuals with registered partnership are also included as married. In addition, age is internalized in the model as a relevant control variable that is constructed by subtracting the respondent's birth date from the year in which the interview was conducted. In addition, the variable age squared is added to the model to capture the possible non-linear relationship of age with health. The education variable is based on the International Standard Classification of Education (ISCED) which allows for the standardized reporting of education statistics according to an internationally agreed set of definitions (SHARE release guide, 2018). The variable ranges from one to six, with six being the highest educational level.

4.4 Descriptive statistics

The sample, described in table 1, consists of approximately 48,500 observations and 31,000 individuals and consists of slightly more women than men. The relatively high number of individuals compared to the number of observations is due to the fact that individuals are only observed during employment. Four-fifth of the individuals are married and the sample consist for 90 percent of individuals with permanent contracts. The individuals are between the age of 40 and 70 and the majority is between the age of 50 and 65. Individuals report their health on average between good and very good, have on average one chronic disease and score a 2 on a 12 point EUROD scale. For each question regarding specific metal health problems, around one third of the population answers this question with yes. When only a small portion of the population uses drugs for a specific physical health disease, around 10 percent.

Table 1: Descriptive statistics sample				
Description	*Mean*	Std.	Min.	Max.
Job insecurity	1.95	0.87	1	4
Female	0.52	0.49	0	1
Married	0.79	0.40	0	1
Permanent contract	0.89	0.30	0	1
Educational level	3.35	1.37	1	6
Age	56.4	4.74	40	70
40-45	0.01			
45-50	0.04			
50-55	0.30			
55-60	0.38			
60-65	0.21			
65-70	0.04			
Health measures				
Self-perceived health	3.37	0.98	1	5
Number of chronic diseases	0.99	1.11	0	9
Euro depression scale	1.89	1.90	0	12
Limitations with daily activities	0.26	0.44	0	1
Drugs for high blood cholesterol	.12			
Drugs for joint pain	.08	0.28	0	1
Drugs for coronary disease	.03	0.16	0	1
Depression	.34	0.34	0	1
Fatigue	.27	0.26	0	1
Number of observations	48,565			
Number of individuals	30,978			

Figure 1 shows health levels for each level of job insecurity. With higher levels of job insecurity on average more health problems are observed. Self-perceived health decreases, with the largest difference shown between the second and the third level of job insecurity. After remaining constant between the first and second level, the EUROD scale is on average substantially higher for levels three and four. The same goes for ADL and the number of chronic diseases, showing that in general individuals with higher levels of job insecurity have on average more health problems. Figure 2 gives an overview of the development of the most important variables over time. Job insecurity remains constant over the 11-year time span, as do the health variables limitations for daily activities and chronic diseases. There is a slight increase in the average of the EUROD scale and a decrease in the average regarding self-perceived health.

Figure 1

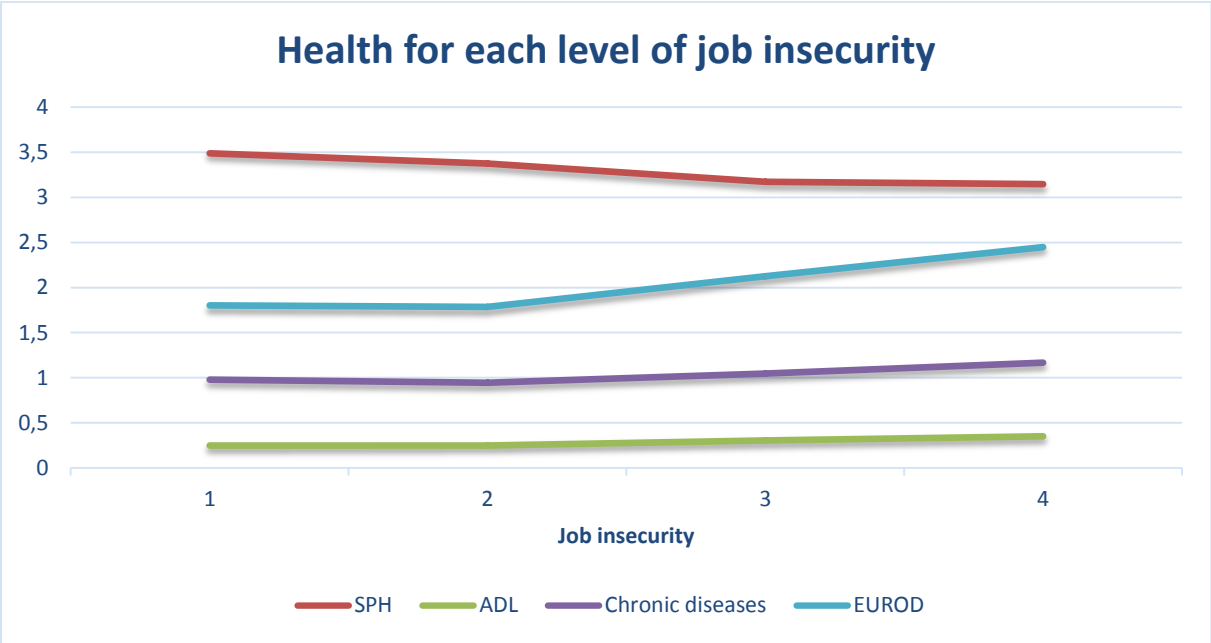


Figure 2

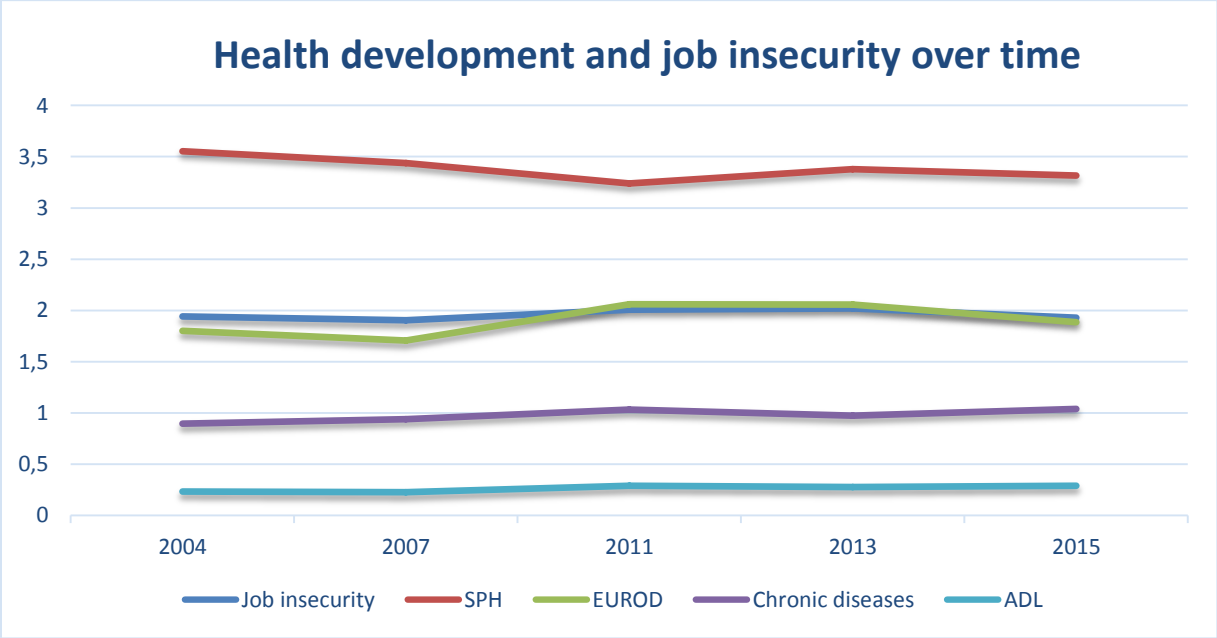


Figure 3 shows how variables of interest develop with different age groups. As shown in the figure, job insecurity is almost the same for all groups. Overall, the figure shows that older age groups have more health problems. Take note that individuals are followed over 11 year time period and that some individuals are part of different age groups at different moments in time.

Figure 3

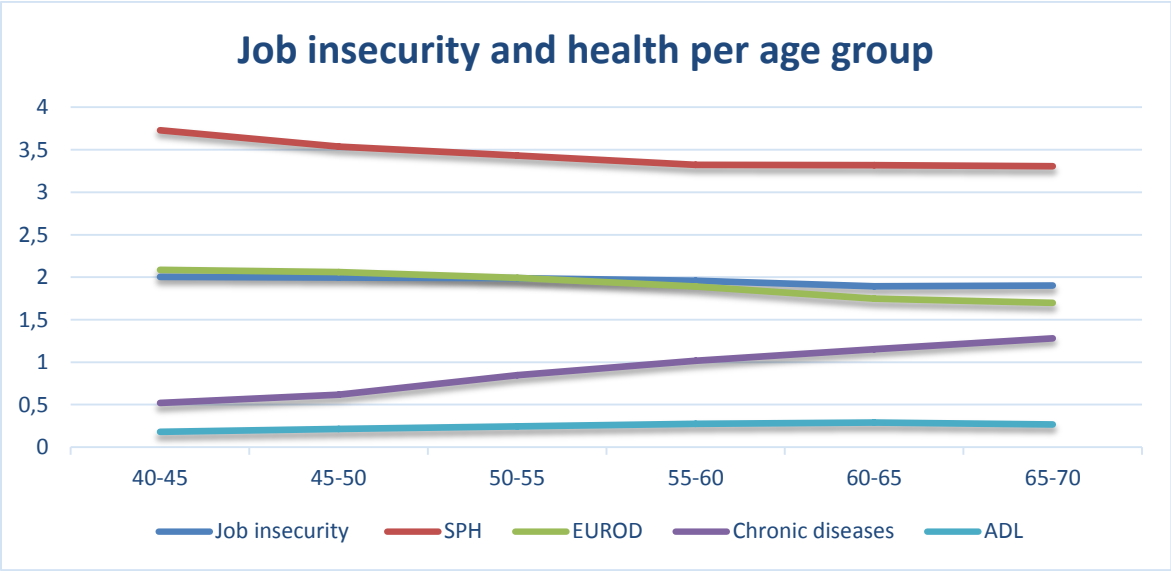


Figure 4 shows EPL for temporal and permanent contracts on average between the years 2004-2015 and the average actual dismissal rates per country. Countries are ordered by the height of the percentage of individuals that experience job insecurity in that specific country (percentages not shown). Hungary, with around 37%, has the highest percentage of individuals that experience job insecurity. The lowest level is in Austria with slightly more than 10% of the individuals experiencing job insecurity. The blue bars represent the actual dismissal rates and the red and green bars represent the stringency of EPL for permanent and temporal contracts, respectively. Dismissal rates can, in the broad sense, be seen as objective job insecurity. Figure 4 shows that in some cases where job insecurity in a country is high, the actual dismissal rate is relatively low. Indicating that job insecurity is a broader concept than the fear for actual job loss. Moreover, the figure shows no direct observable link between dismissal rates, EPL and job insecurity. As, for example, the Czech republic and Portugal have relatively stringent EPL, while having high job insecurity and high dismissal rates. Greece and Denmark have less stringent EPL, showing low job insecurity and low dismissal rates.

Figure 5 shows the distribution of job insecurity for the whole sample and all examined heterogeneous groups. With regard to the whole population, approximately one-fourth of the population experiences job insecurity, showing that the majority of the population does not experience job insecurity. The distribution of heterogeneous groups is very similar. There is only slightly more job insecurity experienced by men, unmarried individuals and the age group 40-55.

Figure 4

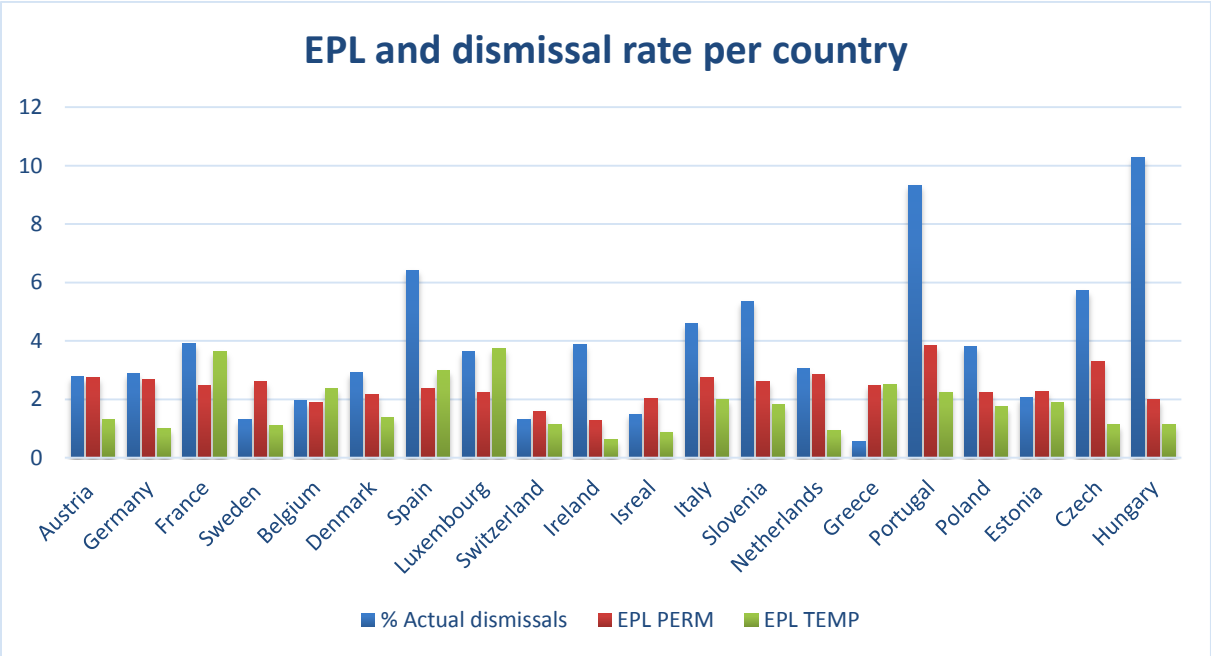
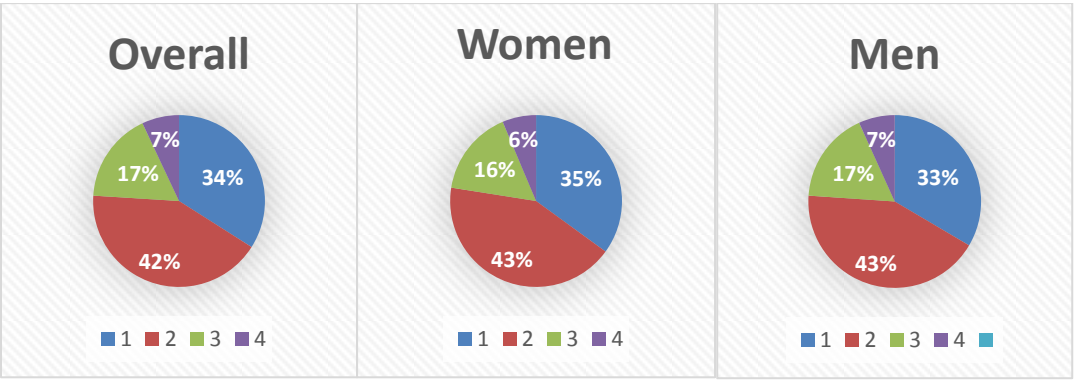
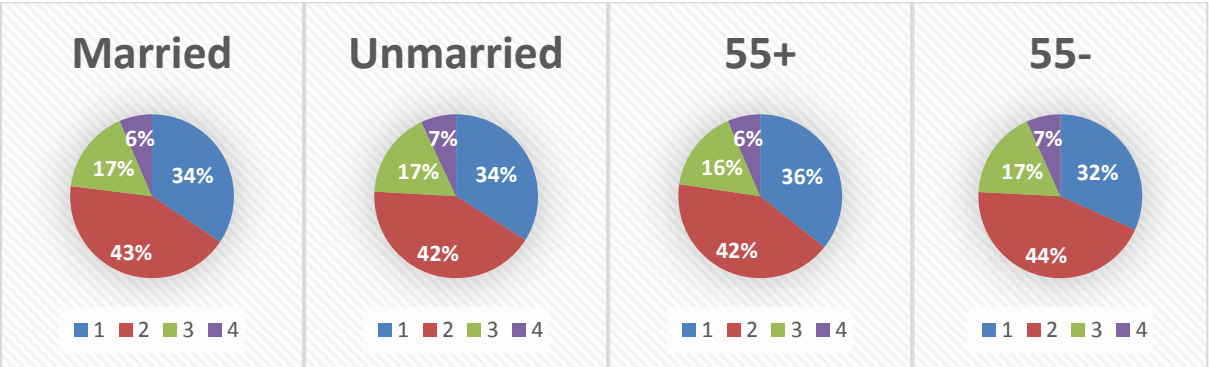


Figure 5 – Distribution levels of job insecurity per subgroup





5. Results

This chapter provides an analysis of the results of this study. The table below presents the results of the job insecurity coefficients for each dependent variable in which control variables are not shown. Take note that country and wave dummies are incorporated in all the regression models, meaning that the models control for country and time specific characteristics. Extended estimation results, including control variables, are presented in appendix D.

5.1 Probit and IV estimates

Table 2: Regression coefficients, independent variable: Job insecurity

Dependent variables	(O)P		IV (O)P	
Broad health measures				
Self-perceived health	-0.095***	(0.006)	-0.104	(0.083)
Chronic diseases	0.034***	(0.006)	0.314***	(0.042)
Euro depression scale	0.098**	(0.006)	0.412***	(0.032)
Limitation with daily activities	0.082***	(0.008)	0.460***	(0.053)
Specific physical health measures				
Drugs for blood cholesterol	0.016	(0.010)	0.193***	(0.073)
Drugs for joint pain	0.068***	(0.010)	0.364***	(0.068)
Drugs for coronary diseases	0.026*	(0.014)	0.234**	(0.107)
Specific mental health measures				
Depression	0.090***	(0.008)	0.398***	(0.055)
Fatigue	0.094***	(0.008)	0.368***	(0.057)
Instrumental variables				
EPL temporary			0.041**	(0.023)
EPL permanent			-0.124***	(0.046)
N=48,565				

Standard errors are in parenthesis and level of significance is *<0.10 **<0.05 ***<0.01.

All models include the following control variables: sex, age, age^2, education level, married, country and wave dummies.

Table 2 shows coefficients of the effect of job insecurity on different health dimensions for both the (ordered) probit model and the instrumental variable (ordered) probit model. Overall, the (ordered) probit coefficients show positive associations for all the different health dimensions, except self-perceived health. However, self-perceived health is the only dependent variable that is negative when health is decreasing. Therefore, all the coefficients show that higher levels of job insecurity are associated with decreased health. Almost all (ordered) probit coefficients are highly significant, except for the drugs for coronary diseases variable.

Overall, the (ordered) probit models show that increased job insecurity is associated with a decrease in health. However, the focus of this thesis is on uncovering the causal effect of job insecurity on health. The coefficients from the (ordered) probit IV-regression are results that can be interpreted as causal. IV-coefficients show in almost all cases a positive effect of job insecurity on different health problems. All effects are highly significant with the exception of self-perceived health. The effects measured by the (ordered) probit IV-regression models give in almost all cases the same direction as the (ordered) probit model.

In the lower section of the regression table, the coefficients of the instrumental variables are presented. The coefficients shown are those stemming from the EUROD scale model for reasons of clarity. All other models give similar coefficients. The instruments show the effect of EPL for both temporal and permanent contracts. The coefficient for permanent contracts gives a negative coefficient that indicates that individuals that can build on more stringent EPL for permanent contracts experience less job insecurity. Take note that with the inclusion of country dummies, the effect of the EPL indicators can only be interpreted as the difference within countries over time. The theoretical proposition that a higher level of EPL strictness results in lower experienced job insecurity is a plausible one. Individuals are feeling more secure about their job with more stringent EPL, because it is harder to get fired.

However, the sample consists not only of individuals with permanent contracts and therefore the effect of EPL for permanent contracts is ambiguous. Other performed regression models in which effects of EPL are differentiated for individuals with permanent and temporal contracts, show that EPL has different effects for both groups (results not shown). For instance, the effect of EPL for permanent contracts affects individuals with temporary contracts, increasing their job insecurity. It could be that more stringent EPL for permanent contracts could result in more temporal contracts, since it is a higher investment for employers

to hire employees with permanent contracts and, therefore, harder for individuals with temporal contracts to get a permanent contract.

The coefficient of EPL for temporal contracts shows a positive sign, indicating that individuals in countries with a higher level of EPL for temporal contracts experience more job insecurity. This contradicts the expectation that increased EPL causes lower job insecurity. However, just as with EPL for permanent contracts, this effect is not unambiguous. One reason for this unexpected direction could be that EPL for temporal contracts works counterproductive. An increased stringency of EPL could mean that the number of times a contract can be extended for a non-permanent period is reduced. This requires employers to offer permanent contracts after a relatively shorter period. Instead of increasing the number of permanent contracts, this type of legislation could lead to sooner lay-offs for employees with temporal contracts, resulting in increased job insecurity for this particular group.

Overall, the results show almost no difference in direction for the coefficients between the normal and the IV-regression model. This means that the direction of the estimated associations are not different from the direction of the estimated causal effects. The instrumental variable approach, conducted by Caroli and Godard (2016), found insignificant results for most health aspect that were significant with an (ordered) probit model. The difference in sample size, which is approximately 4500 compared to 45000 in this study, can explain this difference. When comparing results, coefficient stemming from the instrumental variable approach are larger in comparison to the standard probit models. This is similar to the results presented by Caroli and Godard (2016).

The proposition that the association between job insecurity and different health dimension is driven by reversed causality or ‘third’ factors is contradicted by the results from this thesis. Except for the results regarding the self-perceived health measure, which becomes insignificant after using an instrumental variable approach. This is the only measure out of ten health measures of which the effect disappears after using a model fit for causal interpretation. Based on these results the main hypothesis of this study can be rejected.

5.2 Marginal effects

To strengthen the conclusion regarding the main hypothesis, an additional analysis is conducted. Comparing coefficients of table 2 is somewhat problematic, since different results stemming from (ordered) probit models are not suitable for marginal interpretation. To account for this problem marginal effects are computed. Take for example the EUROD

variable, that varies from 1= not depressed to 12= very depressed. The coefficients in table 3 represent the increase in likelihood that an individual will be in one of the specified scales, for each unit increase of the independent variable. All coefficients represent the likelihood of being in scale one of the specific variable. Table 2 shows -0.032 for the EUROD coefficient with an ordered probit model, which means that with an increase in job insecurity of one level, the likelihood of being in scale 1=not depressed is decreased by approximately three percentage points. In this specific case this means that job insecurity decreases the chance of not being depressed, indicating deterioration of mental health for each level increase of job insecurity.

A majority of the dependent variables in the analysis are dummy variables. Level one for a dummy variable represents a total different value than with the ordinal EUROD variable, since this level represent the presence of a specific health problem. As mentioned before, all variables presented in table 3 only show the marginal effect for value one of all ordinal and dummy variables. When examining the presented results, it is important to take into account that the value of one represents a different meaning for different variables. This is mostly important in the case of ordinal variables. When dummy variables are examined the value one always represents the presence of a certain physical or mental health problem.

The most important analysis that is derived from these results concerns the difference between the marginal effect for the standard (ordered) probit models and IV (ordered) probit models. Coefficients in table 3 are all highly significant with the exception of self-perceived health, drugs for high blood cholesterol and drugs for coronary diseases. With the EUROD depression scale the coefficients show that there is 3.2 and 13 percent points less chance that the individual is in level 1= not depressed for each unit increase of the variable job insecurity, for the ordered probit model and the IV ordered probit model, respectively. This result has two implications, namely that with the increase of job insecurity the likelihood that someone is not depressed decreases and with the instrumental variable approach the coefficient is substantially larger. The latter indicates that the real causal effect is larger compared to association between job insecurity and the EUROD scale.

When all other coefficients are examined, the same tendency remains. Take another example, in which an increase in one level of job insecurity, increases the likelihood that someone experiences limitations with daily activities by 2.6 and 14.2 percentage points. Also showing

Table 3: Marginal effects, independent variable: Job insecurity

Dependent variable	(O)P		IV (O)P	
Broad health measures				
Self-perceived health	0.005***	(0.000)	0.005	(0.004)
Chronic diseases	-0.013***	(0.006)	-0.116***	(0.047)
Euro depression scale	-0.032***	(0.001)	-0.130***	(0.010)
Limitation with daily activities	0.026***	(0.002)	0.142***	(0.015)
Specific physical health measures				
Drugs for blood cholesterol	0.003	(0.002)	0.037**	(0.014)
Drugs for joint pain	0.010***	(0.010)	0.058***	(0.068)
Drugs for coronary diseases	0.002*****	(0.014)	0.016*	(0.102)
Specific mental health measures				
Depression	0.031***	(0.003)	0.134***	(0.017)
Fatigue	0.030***	(0.002)	0.114***	(0.017)
Instrumental variables				
EPL temporary			0.065***	(0.023)
EPL permanent			-0.232***	(0.065)
N=48,565				

Standard errors are in parenthesis and level of significance is *<0.10 **<0.05 ***<0.01.

All models include the following control variables: gender, age, age^2, education level, married, country and wave dummies.

All marginal effects shown in this table represent the marginal effect for level one on the binary and ordinal scale

that job insecurity increases health problems and the causal effect of job insecurity is higher compared to the coefficient that only represents association. With the exception of insignificant results, the same goes for all other examined health aspects.

One of the main explanations for the causal effect being larger could be that unobserved characteristics, that are present when examining associations, are causing job insecurity to be higher and health problems to be lower or vice versa. It is a possibility that individuals with bad health self-select into more secure jobs. When this is not controlled for, as is the case the standard probit models, the estimated association is relatively smaller than the actual casual effect.

5.3 Heterogeneous effects

This study also examines differences between heterogeneous groups, with similar (ordered) probit and IV (ordered) probit models. The only addition to these models is an interaction variable, consisting of a dummy variable that is one for a specific group and is interacted with the effect of job insecurity. This makes it possible to have the different effects for both groups present in the same model. It also simultaneously identifies if the effect for both groups are statically significantly different from each other. For example, the coefficient in table 3 next to the dependent variable shows the effect for the group of which the value of the dummy is zero (Men=0) and the coefficient next to the *difference* shows the difference from this coefficient when the value of the dummy is one (Women=1). With this example, the coefficient next to the dependent variable shows the effect of job insecurity on this dependent variable for men and the coefficient of the *difference* shows to what extent the effect for women is different from the effect for men. The table shows this for both (ordered) probit and IV (ordered) probit models.

There are several ways of estimating differences between heterogeneous groups, each with different underlying assumptions. Using an interaction effect assumes that all control variables are the same for both heterogeneous groups. Interacting job insecurity with a dummy for a heterogeneous group involves some endogeneity when no instrument is used for the interaction variable, which is the case in this study. This problem is, however, limited since the differentiated heterogeneous groups are assumed to be exogenous, with some suspicion of endogeneity with regard to marital status. Differences are also estimated by running separate models for each group, which solves the problem regarding endogeneity and differentiates the effect of control variables (results not shown). However, due to decreased

observations the instrumental variables become highly insignificant in many cases, decreasing the validity of the models and results. Therefore, an interaction variable is chosen over separate models for each group of which results should be interpreted with caution.

5.3.1 Gender

The first two columns of table 4 show differences between men and women for a (ordered) probit model and an IV (ordered) probit model. Most of the coefficients are insignificant, meaning that for most health aspects there is no significant difference between men and women. However, for mental health aspects, EUROD scale and depression, there is a significant difference indicating that the effect for women is lower than for men. For the EUROD scale, the coefficient for the ordered probit model is significant and that of the IV ordered probit model is weakly significant. The coefficients for depression are highly significant. Significant differences in both models strengthen the result that the effect of job insecurity on mental health is somewhat more present for men than for women. These results confirm the theoretical propositions that men have to meet certain societal expectations and fulfill a certain role within the family that cause the effect of job insecurity to be more present for men. One could expect that these expectations are more present in the sample of this study, which contains mostly older men that could have more traditional perspectives. When examining the results, the hypothesis stating that men experience more negative health problems from job insecurity can be accepted. The coefficient showing the difference with the IV estimates is, however, relatively small. Showing that there is only a marginal difference between men and women.

Take note that there is also a difference for the effect of job insecurity on blood cholesterol in which the effect is larger for women than for men. This indicates that the effect of job insecurity on the use of drugs for high blood cholesterol is more present for women than for men. This can also be due to women being more likely to use drugs for this specific disease than men. This is the only variable for which a difference is found with an IV probit model when there is no difference found with a probit model. However, there is only one coefficient showing a difference between specific physical health problems. Therefore, evidence for actual differences is limited and evidence mostly points in the direction of confirming the hypothesis.

5.3.2 Marital status

The second two columns of table 4 consist of results showing differences between individuals that are married and unmarried individuals. Similar to the difference between gender, the

results show no differences for most of the health aspects. Strongest results are found with regard to depression and the EUROD scale. Individuals that are married experience a relatively smaller effect of job insecurity on mental health aspects, with specific differences found for depression. This strengthens the idea that unmarried individuals experience more mental health problems from job insecurity, since they are less likely to receive mental and economic support from their spouse. Robustness of these results is relatively strong, since coefficients for both variables in both models are highly significant. Additionally, only little evidence is found for differences with regard to the use of drugs for joint pain. These results are weakly significant and only marginally strengthen the idea that unmarried individuals are relatively more affected by job insecurity than unmarried individuals. Overall, the hypothesis that there is no difference between individuals with different marital status is contradicted. This mostly applies to results concerning differences with respect to mental health problems.

5.3.3. Age

In contrast to the other heterogeneous groups, almost no differences are found between age groups. Only weakly significant results are found for the EUROD scale, indicating that older individuals experience less mental health problems from job insecurity. Significant differences are found for drugs for high blood cholesterol, showing that the effect of job insecurity on this specific physical health problem is more present for older individuals. An explanation for these differences could be that stress experienced from job insecurity is more likely to affect the physical health of older age groups and the mental health of younger age groups. Older individuals are less likely to experience mental health problems, like depressions, and more likely to experience physical health problems. However, the hypothesis stating that there is no difference between age groups cannot be rejected, due to the fact that evidence for differences is very limited.

Overall, differences between heterogeneous groups do not differ after using an instrumental variable approach. Only one of all observed coefficients changes from insignificant to significant after moving from association to causation. One of the main reasons to examine differences for gender is that Caroli & Godard (2016) only use men in their sample. Major

Table 4: Heterogeneous groups, independent variable: Job insecurity

	Gender				Marital status				Age groups			
Health dimensions	(O)P		IV (O)P		(O)P		IV (O)P		(O)P		IV (O)P	
Self-perceived health	-0.087***	(0.009)	-0.100	(0.084)	-0.099***	(0.014)	-0.099	(0.088)	-0.093***	(0.008)	-0.095	(0.087)
Difference	-0.016	(0.012)	-0.016	(0.012)	0.005	(0.016)	0.005	(0.015)	-0.002	(0.007)	-0.002	(0.006)
EUROD	0.111***	(0.008)	0.420***	(0.032)	0.145***	(0.013)	0.462***	(0.034)	0.107***	(0.008)	0.428***	(0.032)
Difference	-0.024**	(0.012)	-0.020*	(0.011)	-0.059***	(0.015)	-0.055***	(0.015)	-0.013*	(0.007)	-0.011*	(0.007)
ADL	0.075***	(0.011)	0.458***	(0.055)	0.081***	(0.016)	0.462***	(0.056)	0.080***	(0.010)	0.462***	(0.055)
Difference	0.014	(0.015)	0.016	(0.014)	0.002	(0.018)	0.004	(0.017)	0.004	(0.009)	0.005	(0.008)
Depression	0.107***	(0.011)	0.424***	(0.056)	0.230***	(0.016)	0.434***	(0.056)	0.095***	(0.009)	0.412***	(0.055)
Difference	-0.031**	(0.014)	-0.028**	(0.014)	-0.039**	(0.018)	-0.035**	(0.017)	-0.008	(0.008)	-0.006	(0.008)
Fatigue	0.098***	(0.011)	0.368***	(0.058)	0.099***	(0.016)	0.371***	(0.058)	0.098***	(0.010)	0.370***	(0.057)
Difference	-0.007	(0.015)	-0.005	(0.014)	-0.006	(0.017)	-0.004	(0.017)	-0.006	(0.009)	-0.005	(0.008)
Blood cholesterol	-0.013	(0.013)	0.162**	(0.078)	0.0022	(0.021)	0.187**	(0.079)	-0.002	(0.013)	0.165**	(0.076)
Difference	0.061	(0.018)	0.062***	(0.018)	-0.008	(0.024)	-0.008	(0.023)	0.024**	(0.012)	0.024**	(0.012)
Joint pain	0.072***	(0.015)	0.366***	(0.069)	0.103***	(0.021)	0.393***	(0.070)	0.069***	(0.013)	0.364***	(0.068)
Difference	-0.007	(0.020)	-0.005	(0.019)	-0.046*	(0.024)	-0.041*	(0.023)	-0.002	(0.011)	-0.001	(0.011)
Coronary disease	0.017	(0.018)	0.229**	(0.108)	0.020	(0.032)	0.230**	(0.110)	0.044**	(0.020)	0.249**	(0.108)
Difference	0.021	(0.029)	0.022	(0.028)	0.006	(0.036)	0.006	(0.034)	-0.025	(0.019)	-0.024	(0.018)
N=48,565												

Standard errors are in parenthesis and level of significance is *<0.10 **<0.05 ***<0.01.

All models include the following control variables: gender, age, age^2, education level, married, country and wave dummies.

Coefficient next to dependent variable shows the coefficient for men, married individuals and individuals above the age of 55.
The *Difference* coefficient shows how the coefficients for women, unmarried individuals and individuals below the age of 55 differ from the coefficient for men, married individuals and individuals of 55 years and older, respectively.

differences between men and women with regard to the effect of job insecurity and health could partially explain the different results in this study. However, minor differences are found between men and women. Only mental health problems are somewhat more present for men. The idea that the results in this study are mostly driven by the inclusion of women in the sample can be rejected based on this analysis.

5.4 Sensitivity analyses

As described in earlier chapters, a sensitivity analysis is conducted in which the independent variable concerning job insecurity is changed from a ordinal variable to a dummy variable that is one when the individual experiences job insecurity and zero if the individual experiences no job insecurity. This analysis is used to examine whether the coefficients from the same regression models differ with the changed independent variable.

The results (presented in appendix A) show that most of the coefficients give the same direction as with the other regression models. There are some slight differences for some specific health factors. The most interesting difference is that the coefficient for drugs for coronary disease changes direction. Furthermore, the coefficient for self-perceived health that is insignificant in the previous models, becomes significant and shows a negative sign, indicating that job insecurity decreases self-perceived health. The last difference shown by the sensitivity analysis, is the coefficient for drugs for high blood cholesterol that becomes highly insignificant. The sensitivity analysis shows, despite some deviations, that the majority of the coefficients point in the same direction as the other regression models. The results from the sensitivity analysis strengthen the finding that job insecurity has a causal effect on different health dimensions, since this analysis shows a causal relation for seven out of nine dependent variables.

In addition, a sensitivity analysis is conducted for the same models that exclude all data from wave 6, since EPL variables are extended for wave six due missing data on EPL indicators for the year 2015. The sensitivity analysis shows that results become less significant, especially the coefficients for IV estimates of specific mental health problems. Coefficients for all other health aspects remain significant or weakly significant. This sensitivity analysis strengthens the analysis by showing that results remain similar, with the exception of specific mental health aspects.

6. Conclusions and discussion

This chapter provides an answer to the research question: "*To what extent has job insecurity a causal effect on mental, physical and subjective health of individuals in Europe between the age of 40 and 70, and to what extent are there any differences between health dimensions and heterogeneous groups?"*. The main focus of this master thesis is uncovering the causal effect of job insecurity on different health dimensions while many studies in the literature only focus on association. By conducting an instrumental variable approach in addition to a standard (ordered) probit model, this studies examines the difference between causal effects and associations.

Based on results of this study, the main conclusion is that there is a negative causal effect of job insecurity on almost all dimensions of health examined in this study. Job insecurity causes deterioration of general-, specific mental- and specific physical health dimensions. A marginal effects analysis is conducted that shows, when a model for causal interpretation is used, that the effect of job insecurity on health becomes substantially larger. With a standard probit model the chance of a depression increases with 3 percentage points, while with an instrumental variable approach the increase is 13 percentage points. Similar differences are found for almost all examined health factors. This indicates that the effect of job insecurity on health is more profound than previous studies have found, of which results are only based on associations. These differences could be explained by the proposition that individuals with bad health, self-select into more secure jobs, which is only accounted for by IV models.

This contradicts the main hypothesis based on previous research done by Caroli and Godard (2016), which states that there is no causal effect of job insecurity on health, when association of the same relation is, in fact, present. Based on the results of this study it can be concluded that this is not the case. One explanation for this occurrence could be that the sample of Caroli and Godard (2016) is much smaller and therefore lack of enough identifiable force could have led to insignificant results. It is also possible that the research design of Caroli and Godard (2016) still contains some endogeneity due to the selection of only men with permanent contracts, resulting in unobserved factors causing deviating results. Another possible explanation concerns the conceptualisation of job insecurity that is slightly different in both studies.

Based on the proposition that this research design has uncovered the actual causal relation of job insecurity on health, the effects found in this study have serious implications for policy

advice. Job insecurity causes decreased mental and physical health, implying that changing labour market dynamics can seriously affect health of the population and impose costs on society. Policy makers focussing on labour market related legislation should take into account that, if their policy is likely to increase job insecurity, this is affecting health of employees and related cost should be internalized when examining welfare effects.

One potential limitation of this study is the fact that some selection bias is involved. Individuals that experience job insecurity only consist of employed individuals that can have some personal characteristics, like social skills or motivation, that are less present for the unemployed population. For improved causal estimations, a selection model should be added that takes into account that the sample only consists of employed individuals. Few selection models are run as an extension of the models used in this study, showing similar results after accounting for selection bias (results not presented). However, this analysis is too limitedly executed for reasons of scope. To improve causal estimations that are better suitable for policy advice it is recommended to incorporate selection models when the effect of job insecurity on health is examined in future research.

Additionally, this study examines differences between heterogeneous groups and finds differences for gender and marital status. With regard to the differences between men and women the hypothesis that men are more affected by job insecurity is confirmed. However, substantial and significant differences between men and women are only found with respect to mental health problems, showing that the effect of job insecurity on health is stronger for men than women. This also applies to the difference for marital status in which unmarried individuals experience more mental health problems from job insecurity. The hypothesis, stating that there is no difference for marital status, is therefore partially contradicted by this study. There is no convincing evidence showing differences between age groups, which is in line with results from existing literature. Therefore, the hypothesis stating that there is no difference between age groups could not be rejected.

The difference between men and women is the most interesting, since the only study that examined the same relation trough an instrumental variable approach was based on a sample only consisting of men (Caroli & Godard, 2016). Deviating results from this study, could mostly be driven by women. However, by examining the differences, this study rules out this possibility. Take note that there is still some potential bias in the estimates regarding heterogeneous groups, which is described in chapter 5.3. Therefore, it is recommended to

conduct an improved analyses by integrating instruments for the interaction term that estimates the difference between heterogeneous groups, which is not done in study due to reasons of scope.

When differences between heterogeneous groups are examined, the most robust results show that increased job insecurity is more problematic for men and unmarried individuals. Policies focussed on affiliated topics should, despite the fact that difference are marginal, take into account that the most vulnerable groups who suffer the most from job insecurity are unmarried men. When labour market policies affect labour markets that are mostly occupied by men and unmarried individual's, policy makers should take potential health problems into account.

In contrast to previous literature, this study uses panel data. The utilization of panel data provides time varying instrumental variables, increasing the strength of the used instrumental variables leading to improved models. Despite the fact that variation for fixed effects models was too limited, the use of panel data has contributed to improved estimates of the relation between job insecurity and health. Moreover, Burgard et al. (2009) stress the importance of addressing the possibility of a negative reporting style and does so by using a fixed effects model. With the use of an instrumental variables approach unobserved third factors are accounted for, which also resolves this issue.

One of the limitations of this study is that the sample only consist of individuals from 40 years and older. Therefore, the results of this research cannot be generalized to the whole population. Despite the fact that job insecurity is an interesting topic for the older segment of the working population, it is recommended to conduct the same research for different age groups. Moreover, not all heterogeneous groups of interest are covered by this study. Examining differences of the effect of job insecurity on health for individuals with different labour market contracts and educational level is important for future research, which is also stressed by Schaufeli (2016).

Despite some minor limitations, this study provides a next step in unravelling the actual casual effect of job insecurity on different health dimensions, by presenting robust evidence that increased job insecurity deteriorates health. Having serious implications for labour market related policies in the light of recent economic trends and changing labour market dynamics.

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Appendix A – Sensitivity analysis

Table 5: Sensitivity analysis, independent variable: Job insecurity dummy

Dependent variable	OP		IV OP	
Broad health measures				
Self-perceived health	-0.173***	(0.013)	-0.196	(0.119)
Chronic diseases	0.033***	(0.006)	0.304***	(0.047)
Euro depression scale	0.219***	(0.013)	0.174***	(0.060)
Limitation of daily activities	0.179***	(0.015)	0.660***	(0.211)
Specific physical health measures				
Drugs blood cholesterol	0.045**	(0.019)	-0.048	(0.0321)
Drugs for joint pain	0.133***	(0.020)	0.658***	(0.228)
Drugs for coronary diseases	-1.089***	(0.163)	0.068*	(0.030)
Specific mental health measures				
Depression	0.192***	(0.015)	-0.042	(0.220)
Fatigue	0.198***	(0.015)	-0.094	(0.329)
Sleeping problems	0.058***	(0.007)		
Instrumental variables				
EPL temporary			0.065***	(0.023)
EPL permanent			-0.232***	(0.065)
N=48,565				

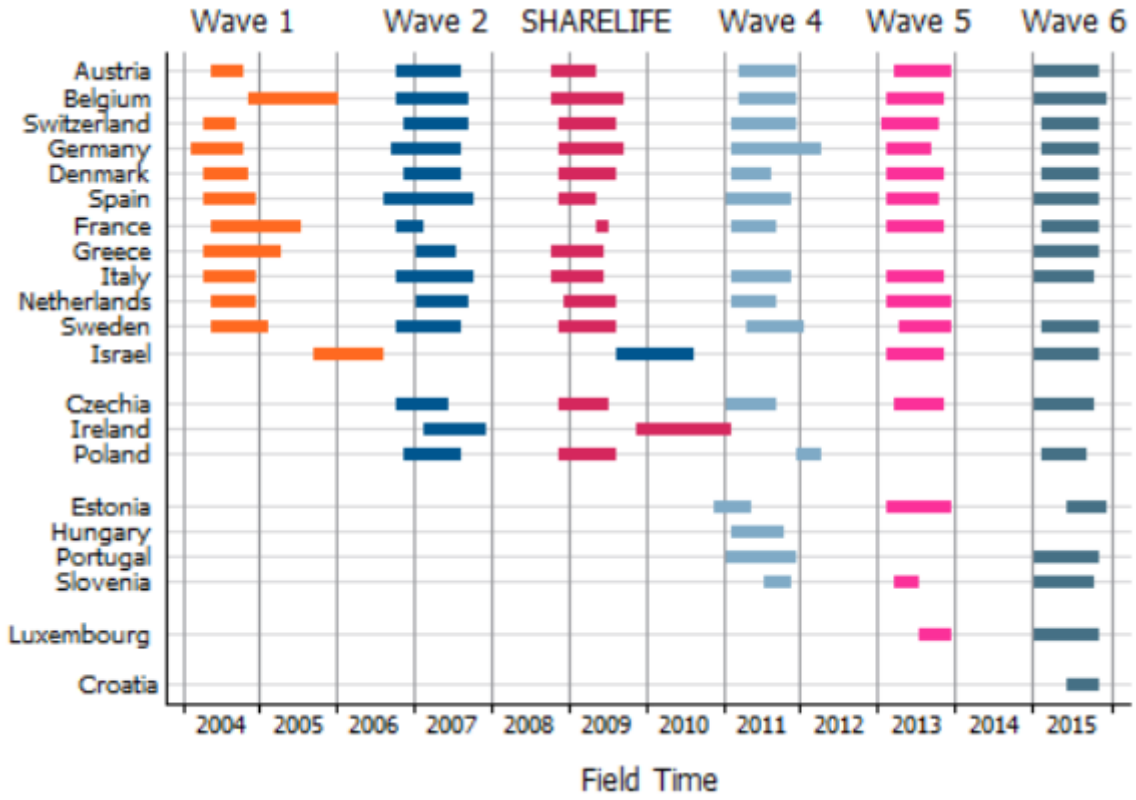
Standard errors are in parenthesis and level of significance is *<0.10 **<0.05 ***<0.01.

All models include the following control variables: gender, age, age^2, education level, married, country and wave dummies.

All marginal effects shown in this table represent the marginal effect for level one on the binary and ordinal scale

Appendix B – Waves overview

Figure 6



Source (SHARE, 2018)

Appendix C – EPL over Time

Table 6: EPL over time (1)

Country		2004	2007	2011	2013
Austria	EPR	2.37	2.37	2.37	2.37
	EPT	1.31	1.31	1.31	1.31
Belgium	EPR	1.89	1.89	2.08	1.89
	EPT	2.38	2.38	2.38	2.38
Czech	EPR	3.31	3.05	3.05	2.92
	EPT	0.50	1.13	1.31	1.44
Denmark	EPR	2.13	2.13	2.2	2.2
	EPT	1.38	1.38	1.38	1.38
Estonia	EPR			1.81	1.81
	EPT		1.38	1.88	1.88
France	EPR	2.47	2.47	2.38	2.38
	EPT	3.63	3.63	3.63	3.63
Germany	EPR	2.68	2.68	2.68	2.68
	EPT	1.00	1.00	1.00	1.13
Greece	EPR	2.80	2.80	2.17	2.12
	EPT	2.75	2.75	2.5	2.25
Hungary	EPR	2.00	2.00	2.00	2.00
	EPT	1.13	1.13	1.13	1.25
Ireland	EPR	1.44	1.27	1.27	1.4
	EPT	0.63	0.63	0.63	0.63

EPR= Employment protection legislation for permanent contracts

EPL= Employment protection legislation for temporal contracts

Source: (OECD, 2013)

Table 7: EPL over time (2)

Country		2004	2007	2011	2013
Isreal	EPR		2.04	2.04	2.04
	EPT		0.88	0.88	0.88
Italy	EPR	2.76	2.76	2.76	2.68
	EPT	2.00	2.00	2.00	2.00
Luxembough	EPR	2.25	2.25	2.25	2.25
	EPT	3.75	3.75	3.75	3.75
Netherlands	EPR	2.88	2.88	2.82	2.82
	EPT	0.94	0.94	0.94	0.94
Poland	EPR	2.23	2.23	2.23	2.23
	EPT	1.75	1.75	1.75	1.75
Portugal	EPR	4.42	4.42	4.13	3.18
	EPT	2.56	2.56	1.94	1.94
Slovenia	EPR		2.65	2.60	2.60
	EPT		1.81	1.81	1.81
Spain	EPR	2.36	2.36	2.21	2.06
	EPT	3.25	3.25	2.56	2.56
Sweden	EPR	2.61	2.61	2.61	2.61
	EPT	1.44	1.44	0.81	0.81
Switzerland	EPR	1.60	1.60	1.60	1.60
	EPT	1.13	1.13	1.13	1.13

EPR= Employment protection legislation for permanent contracts

EPL= Employment protection legislation for temporal contracts

Source: (OECD, 2013)

Appendix D – Extended analysis

Table 8: Extended analysis, dependent variable: EUROD

	OP		IV OP	
Second stage				
Job insecurity	0.098***	(0.000)	0.418***	(0.032)
Education	-0.040***	(0.004)	-0.020***	(0.005)
Female	0.400***	(0.011)	0.402***	(0.012)
Married	-0.118***	(0.014)	-.101***	(0.014)
Age	0.060***	(0.017)	0.054***	(0.017)
Age^2	-0.000***	(0.000)	-0.000***	(0.000)
First stage				
EPL temporary			0.079***	(0.025)
EPL permanent			-0.112**	(0.048)
Education			-0.076***	(0.004)
Female			-0.071***	(0.011)
Married			-0.057***	(0.014)
Age			0.028	(0.018)
Age^2			-0.000**	(0.000)
N=48,565				

Standard errors are in parenthesis and level of significance is *<0.10 **<0.05 ***<0.01.

All models include, country and wave dummies

Appendix E – Sensitivity analysis without wave 6

Table 9: Sensitivity analysis excluding wave 6, independent variable: Job insecurity

Dependent variables	(O)P		IV (O)P	
Broad health measures				
Self-perceived health	-0.165***	(0.014)	-0.108	(0.135)
Chronic diseases	0.034***	(0.006)	0.314***	(0.042)
Euro depression scale	0.215***	(0.014)	0.124	(0.076)
Limitation with daily activities	0.170***	(0.017)	-1.00***	(0.027)
Specific physical health measures				
Drugs for blood cholesterol	0.054**	(0.022)	0.496*	(0.245)
Drugs for joint pain	0.140***	(0.024)	0.555*	(0.325)
Drugs for coronary diseases	0.088***	(0.034)	-1.103***	(0.157)
Specific mental health measures				
Depression	0.198***	(0.017)	0.134	(0.234)
Fatigue	0.094***	(0.008)	0.044	(0.308)
Instrumental variables				
EPL temporary			0.041**	(0.023)
EPL permanent			-0.124***	(0.046)
N=48,565				

Standard errors are in parenthesis and level of significance is *<0.10 **<0.05 ***<0.01.

All models include the following control variables: gender, age, age^2, education level, married, country and wave dummies.