

*What is the influence of self-perceived health, well-being, and income on the intention of early retirement? A comparison across Europe based on SHARE data.*

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## I. Introduction

As the developed world struggles with the increasing costs of the aging population and tries to offset those costs by continuously increasing the retirement age, the gap in life-expectancy between the poor and the rich continues to widen. This ultimately leads to inequality in terms of benefiting from old-age benefits and gives rise to questions about this socioeconomic inequality in the developed countries (The Economist, 2012). A possible explanation of the gap between the rich and the poor is the difference in health and access to health care. However, studies from Britain show that there is little difference in treatment rates by income level, which suggests that a large part of these differences may arise from the differences in lifestyle choices. Poor lifestyle choices like smoking, excessive drinking and eating poorly among the less educated can possibly explain the variation in health (Stringhini, et al., 2011). Nevertheless, the less healthy individuals are also more likely to retire earlier due to their inability to keep on working, which consequently creates a burden on the pay-as-you-go state pension scheme used by most of the developed countries. This, combined with the declining fertility rates and the aging population in Europe, creates an important issue for the welfare state (The Economist, 2009). As mentioned earlier, governments are starting to adapt by increasing the retirement age proportionally to the increase in life-expectancy. However, gaining a deeper understanding of the reasons that drive the choice of early retirement among Europeans is needed, as it could provide possible ways to tackle the issue and help create incentives for older workers to stay in the labour force longer.

Previous literature in the field of health economics has tried to investigate what are the reasons for most workers in OECD countries to leave the labour market before the standard pension eligibility age (OECD, 2011). A study reviewing retirement literature in the recent years has identified that the nature of retirement is currently considered a process that unfolds over time, and is influenced by key determinants like family, work-related, macro-economic and socioeconomic factors (Fisher, Chaffee, & Sonnega, 2016). Nevertheless, the study concludes that the factors that are likely to be most important for the decision of early retirement are health and wealth, in combination with individual and work-related factors. Moreover, the retirement policies of the specific country can also influence the intention of early retirement, like the possibilities for bridge employment. Other studies, like the study of Siegrist, Wahrendorf, von dem Knesebeck, Jurges and Borsch-Supan (2006) on quality of work, well-being, and intended

early retirement of older individuals using data from the SHARE survey, suggests that poor quality of work, in terms of control and effort-reward balance, and reduced well-being are the two major conditions that are positively associated with intended early retirement. According to Siegrist et al. (2006), individuals that are satisfied with their job are more likely to stay longer in the labour force compared to the individuals that are unsatisfied with their job. In addition, individuals who experience higher well-being, in terms of more control, autonomy, self-realization and pleasure, are less likely to have an intention of early retirement (Siegrist et al, 2006). Surprisingly, factors like physical health and mental health do not seem to play a big role in the decision process of early retirement. Other research on the topic focuses on factors influencing income among older workers and their well-being, namely the level of financial difficulty, defined as the self-reported ability of the household to meet ends on a monthly basis, older individuals experience and how this affects their well-being (Litwin & Sapir, 2009). Litwin and Sapir (2009) find that the level of financial difficulty ranges vastly across Europe, and is heavily influenced by levels of health and depression. As mentioned earlier, these are the same factors influencing intended early retirement, which could imply that the financial situation of an individual could also be a factor influencing intended early retirement. The financial situation of an individual could influence the decision indirectly, via factors such as well-being and health, but also directly because of expected changes in monthly income as a result of retiring early.

As can be seen above, previous research has investigated the influence of well-being on the intention of early retirement without focusing much on income and the financial situation of the individuals as a factor influencing their intention of early retirement. Moreover, the study of Siegrist et al. from 2006 and most other studies that are based on SHARE data and investigate early retirement have focused on only one of the waves of the SHARE survey; and currently a total of five survey waves is available. This thesis aims to fill this gap in existing literature, and provide more up to date results which makes use of all available SHARE waves, thus utilizing changes in variables over time. This thesis will do this by investigating the following research question:

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Europe is world's oldest continent in demographic terms with 20.6% of the population aged 60 years and over (United Nations, 2007). According to Sirven and Debrand (2008), with ageing comes poor health which consequently leads to reduced economic performance. This makes health an important factor for socioeconomic sustainability as it is a key determinant in enabling older people to participate in both the labour force and in social activities (Sirven & Debrand, 2008). In order to shed more light on the issue of how health influences the ability of individuals to participate in socioeconomic activities and whether it can be linked to intended early retirement, self-perceived health is one of the main variables of interest in this study. In addition to self-perceived health, the effect of mental health on intended labour participation choices of individuals is examined. Well-being has also been found to be one of the main determinants of the intention of early retirement (Siegrist, et al, 2006), thus it is interesting to see whether these results will be confirmed by the additional four waves of SHARE data that this paper analyses. In addition, income is considered to be one of the main indicators of well-being in old age. Some people tend to save for retirement, which can consequently cause them to be healthier, have higher well-being than non-savers and subsequently enable them to retire earlier (Christelis, Jappelli, Paccagnella, & Weber, 2006). As current literature has a mixed opinion on the influence of income on the intention of early retirement, income is included as a main variable in this study.

For the purpose of investigating the factors that influence the intention of early retirement in Europe, the SHARE survey is used. SHARE is a unique panel data database consisting of micro data on health, socio-economic status and social and family network for nineteen European countries and Israel (SHARE, n.d.). It currently consists of 5 waves, of which four will be used in this thesis.

This research continues with the theoretical framework where previous research on health, income, well-being, and early retirement is discussed and their findings are compared. Next follows the data section, where the data from the SHARE survey is discussed, and the way in which the used variables are measured is described. In addition, the section includes descriptive statistics and t-tests to check for self-selection bias. Following is the methodology, where the used statistical methods are discussed- namely panel regression with fixed effects and the included control variables. The research continues with the results section- in it the results are split in five parts- main results,

results by education level, income group, age group, and gender. The section also includes robustness checks- the main results estimated with a logit model; by excluding one country at a time, in order to check whether a specific country might be heavily influencing the results; and a cross-section analysis -to check for the robustness of the panel regression results. Finally, this paper includes the conclusion and discussion section, where the main results are discussed and the research question is answered. Also, the limitations of the research and the suggestions for further research are also included.

## II. Related Literature

Previous research on early retirement using survey data from countries across Europe, performed by Siegrist et al. (2006), has focused on the quality of work and well-being as main determinants of intended early retirement using the first wave of the SHARE survey. The study looks at quality of work, the level of control experienced at work, the effort-reward balance experienced at the workplace, and job satisfaction. Well-being is defined by several indicators, namely, control, autonomy, self-realization and pleasure. The study also takes into account other factors like income, education, age, and gender. Siegrist et al. (2006) find that almost half of the sample intends to leave their job as early as possible, with higher intention for individuals from a lower socioeconomic status and reduced well-being. The prevalence of intended early retirement also varies across gender, age and education. It was found that men are more likely than women to have an intention of early retirement, and the same is true for the age group 55-59, compared to individuals that are over 60. Moreover, the low education levels are also positively associated with intended early exit from work (Siegrist, et al, 2006). Intended early retirement also varies across Europe- from 29% in The Netherlands to 67.2% in Spain. Nevertheless, the factors most strongly and positively associated with intended early retirement are poor quality of work and well-being. In addition, reduced well-being and lower socioeconomic status are found to be strongly related to the indicators used to measure quality of work. Moreover, the results of Siegrist et al. (2006) show that the associations of poor quality of work and reduced well-being are in line with those reported in previous studies on depressive symptoms, poor self-rated health and reduced health functioning. However, the study also has its limitations, as for example respondents with reduced well-being also tend to perceive their work as more stressful,

or respondents that intend to retire earlier may try to justify it by poor quality of their work, hence the direction of causation is not clear-cut (Siegrist, et al, 2006). The availability of panel data of the SHARE survey may help make this issue clearer.

Other studies focus more on the influence of health and income on the decision for early retirement. One of them, conducted by Bazzoli (1985) suggests that issues arise when individuals make self-evaluations of their health status, as the impact of health on the decision of early retirement is greatly overestimated. The results from her research suggest that socioeconomic factors such as income and retirement policies rather than health play a major role in retirement decisions. Thus, changes in the retirement income structure have larger impacts on the decision for early retirement than previously thought (Bazzoli, 1985). A study conducted by van den Bergen, Elders and Burdorf (2010) that investigates the influence of health and work on early retirement finds that low work ability predicts early retirement. Low work ability is a concept based on the assumption that the ability of an individual to perform his or her job depends on the physical and mental demand of the job combined with individual capabilities, determined by health, knowledge, values, attitude and motivation (van den Bergen, Elders, & Burdorf, 2010). The results of the study suggest that poor health, and the amount of the physical and psychological workload are important factors that are positively associated with early retirement. In addition, according to the study, workers with specific or chronic diseases are more likely to retire earlier, and prolonged health complaints are a more decisive factor influencing early retirement compared to more acute health issues (van den Bergen, Elders, & Burdorf, 2010). Moreover, the study finds that nonfinancial rewards in the workplace are of great importance for the retirement decision- rewards in the sense of appreciation, effort-rewards balance, satisfaction and less stress evolve as important for older workers. However, the research does not find a positive effect of a healthy lifestyle on prolonging labour force participation, even though unhealthy lifestyle choices like being overweight, less physical activity or smoking may contribute to a poor health status, and thus indirectly lead to an intention for early retirement (van den Bergen, Elders, & Burdorf, 2010).

Overall, retirement is found to be a complex and dynamic process, influenced by many factors. As the retirement age in Europe continues to increase, largely due to economic policy changes aiming to alleviate the burden on the pay-as-you-go system, the

policies might not be enough to discourage early retirement. Fisher, Chaffee and Sonnega (2016) investigate the retirement timing and its main determinants. According to them, there are many individual, family, and policy factors that can influence the retirement decision, however, factors like health, wealth and retirement planning appear to be more important. For example, retirement planning is linked to earlier retirement and more favourable retirement outcomes (Fisher, Chaffee & Sonnega, 2016). Thus, retirement planning- both mental and financial- has proven to be crucial for the decision of early retirement. In addition, forms of early retirement like bridge employment are to the rise, in which individuals use, for example, unemployment or disability benefits to exit the labour force earlier and bridge the gap to retirement (Fisher, Chaffee, & Sonnega, 2016). Such forms of early retirement are very costly for governments; hence policies should be made in accordance with each other in order to prevent bridge employment. Nevertheless, finding the causes of the intention of early retirement is crucial in preventing early retirement and encouraging labour force participation at an older age, in order to sustain economic growth and development (Inderbitzin, Staubli, & Zweimuller, 2016).

Thus, factors like physical and mental health, well-being, and income are considered as main variables of interest in this research, in order to find the main determinants of intended early retirement and provide suggestions for encouraging older workers to delay their exit from the labour force.

### III. Data

For the purpose of this thesis, the survey SHARE (the Survey of Health, Aging, and Retirement in Europe) will be used, and more precisely the easySHARE- file, which is a simplified version of the SHARE dataset. SHARE is a unique panel data database consisting of micro data on health, socio-economic status and social and family network of approximately 123,000 individuals for 5 waves (more than 293,000 interviews) from the following European countries: Austria, Belgium, Czech Republic, Switzerland, Germany, Denmark, Estonia, Spain, France, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Poland, Portugal, Sweden, Slovenia; and Israel. Up to date, the easySHARE release 2.0.0 is based on SHARE waves 1, 2, 3 (SHARELIFE- information on people's histories), 4 and 5 (SHARE, n.d.). The waves correspond respectively to the following years: 2004, 2006, 2008, 2010 and 2013. The topics provided by easySHARE

include: demographics, household composition, social support and network, childhood conditions, health and health behaviour, functional limitation indices, and work and money.

As the aim of this thesis is to investigate how the intention of early retirement in European countries (and Israel) as a response to changes in self-perceived physical and mental health, well-being and financial situation, the sample will be restricted to all men and women aged between 50 and 65 that have reported doing any paid work during the surveys (both employed and self-employed), as done by Siegrist et al., (2006). The sample of participants (observations) of the full data for the panel regression varies between 16,034 (28,490) and 14,959 (21,022), depending on the included control variables. The main regression model includes 14, 966 individuals (21,036 observations) which is split approximately in half by gender- 7,519 females and 7,446 males.

The dependent variable is looking for early retirement in (main) job. The intended early retirement is accessed by a single question: "Thinking about your present job, would you like to retire as early as possible?", and the answer categories are yes and no. In addition, the analysis will control for the level of satisfaction with the main job through the variable "satisfied with (main) job", as it has been previously found that poor quality of work is positively associated with early retirement (Siegrist, et al, 2006).

For the purpose of this thesis the variables used to measure health are self-perceived health (SPH) and the number of chronic diseases (Chronic), however they do measure different things. Self-perceived health is measured by a standard set of questions that are intended to explain morbidity and mortality among the elderly population. The variable SPH combines them in one variable that can take up to 5 values- 5: excellent, 4: very good, 3: good, 2: fair and 1: poor. The variable Chronic measures the number of chronic conditions the specific individual has according to their doctor. The following conditions are included in the index: hearth attack, high blood pressure or hypertension, high blood cholesterol, stroke or cerebral vascular disease, diabetes or high blood sugar, chronic lung disease, cancer or malignant tumour, stomach or duodenal ulcer, Parkinson disease, cataract and hip or femoral fracture. Self-perceived health measures how the individual perceives his health situation, whereas the variable for chronic diseases is based on the chronic conditions that the individual has according to their doctor. It can also be seen in the correlation matrix below (table 1) that the correlation between the

two variables is  $-0.3263$ , which indicates that the two variables are not strongly correlated. Self-reported health is more a subjective measure of health, as it measures how the individual perceives her own health. In contrast, the variable Chronic is an objective measure of the individual's health situation, as it is based on the doctor's diagnosis. An individual may, consciously or unconsciously, use low self-reported health as an excuse for early retirement, which would make conclusions about the direction of causation regarding the relation between self-reported health and intention of early retirement unclear.

Mental health is based on a depression scale measured by the variable Eurod, which measures current depression on a scale from 0 (not depressed) to 12 (very depressed). The variable is a composite index of twelve items: depression mood, pessimism, suicidality, guilt, sleep, interest, irritability, appetite, fatigue, concentration, enjoyment and tearfulness.

Well-being is measured by CASP-12- a psychometrical questionnaire used to identify the aspects of quality of life that are perceived to be specific to old age- the stage in life representing the transition from work to retirement (Wahrendorf, von dem Knesebeck, & Siegrist, 2006). CASP-12 refers to quality of life measure by using four conceptual domains of individual needs that are particularly relevant to older age- (C) control, (A) autonomy, (S) self-realization and (P) pleasure. The four items measure the degree to which those aspects are perceived as being satisfied by the individual. The CASP score is the sum of these four obstacles and ranges from 12 to 48, with higher scores indicating better quality of life.

Two measures will be used to indicate the financial situation of the individuals- self-reported income level and the ability of the household to meet ends. The individuals report their income level and then they are distributed among the ten income percentiles, for the purpose of the survey. Thus, the variable Income\_pct is a categorical variable taking the values in the range 1-10. In addition, the variable "is household able to meet ends" will be used as an indicator of the financial situation of the household. The question the individuals were asked is the following: "Thinking of your household's total monthly income, would you say that your household is able to make ends meet...". The variable can take four values: 4-with great difficulty, 3- with some difficulty, 2- fairly easily, 1- easily. The ability of the household to meet ends could be perceived as a more accurate

indicator of the financial situation of an individual as the individual may take into account their purchasing power and expenses, when answering the question. Using the variable MeetEnds as a measure of financial level is one of the main contributions of this research, as other research has not focused on this. In addition, there is a difference between the objective variable income percentile and the subjective variable MeetEnds, as for example, even though some individuals might belong to the high income levels, they might as well have a lot of debt, which could result in their low ability to meet end as a household. However, the variable meet ends is still more likely to be relevant for the low income participants in the survey.

The analysis will also control for different levels of educational attainment based on the International Standard Classification of Education (ISCED-97) by splitting the sample based on the level of education, in order to see if there is a difference in the intention of early retirement based on the completed level of education. The education classification includes three levels: “low”- pre-primary, primary, or lower secondary education; “medium” - secondary or post-secondary education; and “high”- first and second stage of tertiary education (Siegrist, et al, 2006).

Other variables include age by means of a continuous variable, as in previous research (Siegrist, et al, 2006), employee or a self-employed in (main) job EMP, total hours worked per week (main job), smoking, drinking behaviour of the individuals, vigorous activities, age and gender, in order to see if these factors might also influence the intention for early retirement and control for those influences. EMP takes values 0 when the individual is an employee and 1 when the individual is self-employed. Smoking is a dummy variable indicating whether the respondent smokes at present. Drinking is a categorical variable, varying from 1 till 7, and measuring the drinking behaviour of the individual in the last six months. Vigorous activities is also a categorical variable that can take values between 1 and 4, measuring the frequency with which vigorous activities like sports, heavy housework, or a job involving physical labour are performed.

The correlation matrix below shows the correlation between all used variables in this research. The correlations between the various variables suggest that there is no strong relation between the variables, therefore the issue of multicollinearity is not an urgent issue. On the other hand, the reported correlations do not account for confounding factors, hence the possibility of strong relations between some variables cannot be

excluded with certainty. Nevertheless, it is interesting to examine the correlation between some of the variables. For example, the correlation between MeetEnds and the income percentile is -0.2844, which is interesting as they are both measures for the financial situation of an individuals. However, there is a difference in what they are measuring- income percentile is a more objective measure, whereas MeetEnds is a more subjective measure. The same is true for the variables Chronic and SRH, which have a correlation of -0.3263, indicating a negative correlation, which is plausible since higher values of Chronic indicate worse health, whereas higher values of SRH indicate better health. Also, the correlation indicates that there is a difference in what the two variables measure, as discussed above.

Table 1-Correlation Matrix

	Early Retirement	MeetEnds	Income_pct	SPH	Chronic	CASP	Eurod	Satisfied	EMP
Early Retirement	1								
MeetEnds	0.1324	1							
Income_pct	-0.0437	-0.2844	1						
SRH	-0.1561	-0.2296	0.1136	1					
Chronic	0.0511	0.0675	-0.0267	-0.3263	1				
CASP	-0.1843	-0.3975	0.1455	0.343	-0.1359	1			
Eurod	0.1068	0.1661	-0.0744	-0.3082	0.1343	-0.3881	1		
Satisfied	-0.2717	-0.2098	0.0835	0.201	-0.0369	0.3081	-0.1708	1	
EMP (employed or self-employed)	-0.0452	0.0169	0.001	0.0382	-0.0176	0.0073	-0.0296	-0.0564	1
Total Hours Worked	0.0157	0.003	0.0613	0.0423	0.019	0.0205	-0.0719	-0.0129	0.163
Age	-0.0905	-0.1052	-0.041	-0.0387	0.1272	0.0496	-0.0548	-0.0653	0.0492
Smoking	0.047	0.1262	-0.0679	-0.0658	-0.0136	-0.082	0.0233	0.0475	-0.0009
Drinking	0.0016	-0.158	0.1185	0.1257	-0.0291	0.0862	-0.0788	-0.0563	0.0681
Vigorous Activities	-0.0119	-0.0052	-0.0216	0.1109	-0.0827	0.077	-0.0682	0.0006	0.0232

	Total Hours Worked	Age	Smoking	Drinking	Vigorous Activities
Total Hours Worked	1				
Age	-0.0122	1			
Smoking	0.0214	-0.0562	1		
Drinking	0.0525	0.0073	0.0634	1	
Vigorous Activities	0.0526	-0.0288	-0.01	0.0519	1

Taking into account the fact that a large part of the dataset is being dropped out, first by choosing the sample of individuals within the age group 50-65 and then selecting the individuals that have participated in at least 2 waves of the survey (excluding wave 3), in order to measure the change in the variables of interest by using panel data, it is possible to encounter the problem of sample selection bias. Sample selection bias occurs when in the process of selection of data for analysis, a non-randomized sample of the population is achieved. In this case, this can occur by selecting a sample of respondents that is not representative of the full population being analysed anymore. Thus, conclusions would be made based on a sample that might differ significantly from the overall population. According to Heckman (1977), sample selection bias arises mainly due to self-selection of the individuals, which arises when individuals select themselves within a group, which in terms leads to a biased sample. A possible cause of self-selection bias in the case of this research is the fact that people in the age group of 50-65 that have participated in only one wave of the SHARE survey are excluded. In order to investigate this further, descriptive statistics of the samples is provided- the mean and standard error (in parenthesis) of the variables of interest for the people that have participated in only one wave, and the same statistic for the participants in at least two survey waves (the sample of interest for this research), respectively in table 2.

The average of early retirement (the intended dependent variable) indeed differs between the two groups, with an average of 0.472 for individuals that have participated in only one wave of the survey, compared to 0.421 for the individuals that have participated in two or more waves. In order to check if this difference is significant and can be due to self-selection bias, an independent sample t-test assuming unequal variances is used to compare differences in means is performed.

Table 2- Independent Sample t-test

	<b>Participation= 1</b>	<b>Participation &gt;2</b>	<b>Difference</b>
<b>Early Retirement</b>	0.472 (0.004)	0.421 (0.003)	-0.051***
<b>Income_pct</b>	6.112 (0.019)	6.101 (0.011)	-0.011
<b>MeetEnds</b>	2.770 (0.006)	2.832 (0.004)	0.062***
<b>SPH</b>	2.935 (0.007)	2.929 (0.004)	-0.007
<b>CASP</b>	37.926 (0.040)	38.136 (0.024)	0.210***
<b>Chronic</b>	0.873 (0.007)	0.835 (0.004)	-0.037***
<b>Eurod</b>	2.195 (0.013)	2.168 (0.008)	-0.027*

As can be seen in the table above, the difference in the two variables is -0.051 and is significant at the 1% level, thus the null hypothesis that the means are equal is rejected. From this follows that there is significant difference in the intention of early retirement between the sample of individuals that have participated in only one wave of the SHARE survey and those that have participated two or more times. As can be seen in table 2, the same independent t-test was repeated for the other variables of interest, namely income percentile, meet ends, self-perceived health, CASP, Chronic and Eurod (depressive symptoms). The difference in means between the two groups is significant at the 1% level for the variables MeetEnds, CASP, and Chronic, whereas it is significant only at the 10% level for Eurod. For the variables income percentile and SPH there do not seem to be any statistically significant differences between the individuals that have participated in only one wave of the SHARE survey and those that have participated two or more times.

As seen above, there are major differences in means for four of the main variables of interest (the dependent variable early retirement, MeetEnds, CASP and Chronic) between the participants in only one of the survey waves and the individuals that have participated in at least two waves. Thus, in order to analyse the impact of this difference on the robustness of the results, a cross section analysis is conducted by using the full

sample which also includes individuals that have participated in one wave as well as the individuals that have participated in at least two waves.

#### IV. Methodology

For the purpose of this research, the data from wave 3 will be excluded as the information collected by this wave is on people's life histories (SHARELIFE) and the wave does not contain information on mental health and employment, which are one of the main variables of interest. In addition, individuals that have participated in only one wave of the survey are excluded because of the individual fixed effects that are included in the model. Also, observations with missing values (non-response) are not used in the statistical analysis because the majority of the missing values are due to the fact that some questions were not asked in the first wave of the survey for particular countries. To check whether this has an effect on the overall results, a robustness check in which one country at a time is excluded from the sample is performed later on in this study. Moreover, due to the fact that in some countries the questions of interest were only asked in one wave of the survey, the countries Ireland, Luxembourg, Portugal and Hungary are excluded from the sample. In order to check what influence this has on the results, a cross section analysis including all 20 countries and all participants in the survey is conducted as a robustness check.

To estimate the effect of changes in health and income through the waves 1, 2, 4 and 5 on the intention of early retirement, a linear probability model will be used to account for the binary nature of the dependent variable. In order to choose between a fixed effects and a random effects model, a Hausman test was conducted. With a chi<sup>2</sup> statistics of 119.04 and significance level of 0.0000, the null hypothesis stating that the difference in coefficients is not systematic is rejected, hence the model will include individual fixed effects. In addition, the fixed effects model will control for country-specific time-invariant factors. Heteroscedasticity-robust errors will be used in all regression specifications, in order to satisfy the ordinary least-square assumption of homoscedasticity. In addition, a significance level of 5% is used for the analysis.

$$y_{i,w} = \beta_0 + \beta_1 \text{IncomePct}_{i,w} + \beta_2 \text{SPH}_{i,w} + \beta_3 \text{CASP}_{i,w} + \beta_4 \text{MeetEnds}_{i,w} + \beta_5 \text{Chronic}_{i,w} + \beta_6 \text{EUROd}_{i,w} + \gamma_{i,w} + \varepsilon_{i,w}$$

$y$  is a binary variable that is equal to 1 if the individual is looking for early retirement in (main) job and otherwise zero.  $i$  and  $w$  stand for the personal identifier and the wave. The other variables are the following:

- IncomePct- income percentile that the individuals belongs to
- SPH: Self-perceived health
- CASP: Quality of life and well-being index, used to measure mental health
- MeetEnds: indicated how easily the house hold is able to meet ends
- Chronic: number of chronic diseases
- EUROd- measures depression level
- $\gamma_{i,w}$ - represents the set of control variables included
  - Satisfied: indicated whether the individual is satisfied with his/her main job
  - EMP: indicates whether the individual is employed or self-employed in main job
  - Thw: indicates the total number of hours worked per week (main) job
  - Smoking: smoking at a present time
  - Drinking: a categorical variables measuring the drinking behaviour of the individual in the last six months
  - Vigorous activities: information on the frequency of doing vigorous activities like sports, heavy housework or a job involving physical labour
  - Age: age at the time of the interview

First, this regression model is estimated for all countries in the survey combined. Afterwards, the sample of individuals is split in three parts- low, middle and high, based on the education level of the individuals and a separate regression is run for each group. In addition, the sample is also split into gender, income level and age groups. Income level consists of three levels- low, medium and high, including respectively income percentiles 1, 2 and 3; 4, 5, 6 and 7; and 8, 9 and 10. Three age groups are formed for every 5 years, 50-55, 55-60 and 60-65, respectively. This is done with the goal of identifying differences in the intention of early retirement, self-perceived health and well-being across the different groups.

Moreover, robustness checks are performed. In order to check the robustness of the results, the main model is estimated with a logit model instead of a linear probability model. In addition, a robustness check, in which one of the countries in the sample is excluded at a time, in order to see whether one or more countries are significantly influencing or changing the results, is performed. Moreover, due to the significance of the difference between the groups of individuals that have participated in only one wave, compared to individuals that have participated in at least two waves of the survey, a cross section analysis including all participants is conducted, as a robustness check. The cross section analysis also includes additional control variables to control for more factors, most of which the panel analyses control for due to the employed individual fixed-effects. The included additional control variables are: a dummy for female, wave of the survey, education level, and a dummy variable for each of the 20 countries.

## V. Results Section

### i. Main Results

The first results from the panel data can be seen in table 3, including the main variables of interest- SPH (measure of self-perceived health), CASP (well-being), Chronic (number of chronic diseases), Eurod (mental health), MeetEnds, the corresponding income percentile, and various control variables. The results are estimated for the age group of interest, namely 50-65.

Model 1 and 2 include only the main variables of interest, with the difference that in column 2 the variable satisfied, which measures how satisfied an individual is with her job, is included. It can be seen that in model 1, meet ends is significant at the 10% level and positively related to the intention of early retirement. However, this changes in the following models, where the coefficient decreases and turns insignificant. This is interesting to observe, as income is also not significant and has really low magnitude of its coefficient which implies that it does not play a major role when determining the intention of early retirement. This contradicts previous research on the topic, as the studies of Bazzoli (1985) and Fisher, Chaffee and Sonnega (2016) indicate that income is one of the main factors influencing early retirement. On the other hand, the research of McGarry (2004) that studies early retirement expectations and its determinants suggests that there is a large effect of self-reported health on the intention of early retirement, whereas changes in retirement expectations are hardly affected by income. In addition,

other studies from Canada (Park, 2010) and Europe (Garcia-Gomez, 2011) have revealed that poor health is a leading determinant of early and unplanned retirement. Also, the study of van den Bergen, Elders and Burdorf (2010) suggests that physical health and chronic diseases are important factors influencing early retirement.

It can be seen that in model 1 self-perceived health is significant at the 5% level and negatively associated with the intention of early retirement, however, the variable also turns insignificant in the following models and it substantially decreases in magnitude. The same holds for chronic diseases, which is also slightly significant in model 1 but does not seem to have a considerable effect on the intention of early retirement, also taking into account its magnitude of 0.0124. Two interesting variables are CASP, the well-being measure, and Eurod, the depression measure. One of the most cited researches on the topic, also using SHARE data, the one of Siegrist et al. (2006), does find that well-being and job satisfaction are among the main determinants of the intention of early retirement. Here, in model 1, CASP is indeed significant at the 1% level, and is negatively related to the intention of early retirement, which means that the more well-being the participant experiences, the less likely she is to retire, which is in line with the findings of Siegrist et al. (2006). However, the magnitude of the coefficient is just -0.00453 which suggests that an increase of 1 point in the CASP scale would subsequently lead to a decrease in the intention of early retirement by 0.0045 which represents the low impact of well-being on the intention of early retirement, even though the coefficient is significant. In addition, when the variable satisfied is added in model 2 CASP turns insignificant in all models, except model 5 where it is significant at the 10% level (this is most likely due to the variable Age that is added in model 5, as there seems to be an interaction between the 2; when Age is included, CASP becomes slightly more significant). This contradicts the results of Siegrist et al, (2006), where well-being is reported as one of the main determinant of the intention of early retirement; in this model it is not. Surprisingly, the variable Eurod, representing the mental health of the participants by measuring depression, is significant at the 1% level in all models. It is also positively associated with early retirement with a coefficient that is slightly increasing through the models (from 0.0121 to 0.0134), which means that the more depressive symptoms an individual experience, the more likely she is to retire. This is in line with the findings of the research from Niedhammer, Goldgberg and Leclerc (2003), which suggests that depressive symptoms can affect work and retirement decisions. Another research on the topic has

also found that depressed individuals retire on average 1.5 years earlier than non-depressed individuals (Karpansalo, et al., 2004). However, the magnitude of the coefficient of Eurod is also not very high, as a 1-point increase in the depression scale (that ranges between 1 and 12) would lead to a 0.0134 increase in the intention of early retirement, which is a rather low magnitude of the effect.

Table 3- Main Results

VARIABLES	(1) Early Retirement	(2) Early Retirement	(3) Early Retirement	(4) Early Retirement	(5) Early Retirement
MeetEnds	0.0102* (0.00598)	0.00635 (0.00848)	0.00715 (0.00855)	0.00683 (0.00855)	0.00927 (0.00874)
Income_pct	0.000302 (0.00169)	-0.00146 (0.00244)	-0.00164 (0.00247)	-0.00155 (0.00247)	-0.00120 (0.00249)
SPH	-0.0114** (0.00531)	-0.00571 (0.00737)	-0.00563 (0.00741)	-0.00552 (0.00741)	-0.00447 (0.00746)
Chronic	0.0124* (0.00670)	0.0122 (0.00941)	0.0117 (0.00951)	0.0114 (0.00951)	0.0105 (0.00956)
CASP	-0.00453*** (0.00104)	-0.00219 (0.00145)	-0.00228 (0.00146)	-0.00235 (0.00146)	-0.00247* (0.00146)
Eurod	0.0121*** (0.00268)	0.0128*** (0.00383)	0.0131*** (0.00385)	0.0130*** (0.00386)	0.0134*** (0.00385)
Satisfied		-0.112*** (0.00983)	-0.111*** (0.00990)	-0.111*** (0.00990)	-0.111*** (0.00988)
Thw			0.00124** (0.000569)	0.00127** (0.000571)	0.00130** (0.000571)
EMP				-0.00276 (0.0135)	-0.00316 (0.0135)
Age					0.00250 (0.00176)
Smoking					0.0291 (0.0234)
Drinking					0.00790 (0.00513)
Vigorous activities					0.000880 (0.00516)
Constant	0.633*** (0.0473)	0.340*** (0.0706)	0.302*** (0.0740)	0.306*** (0.0761)	0.135 (0.126)
Observations	28,490	21,234	21,036	21,028	21,022
R-squared	0.007	0.030	0.031	0.031	0.032
Number of individuals	16,034	15,083	14,966	14,960	14,959

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

With regards to models 3, 4 and 5, it is interesting to notice that most of the main variables of interest turn insignificant, except Eurod, and two of the control variables that are highly significant- job satisfaction and the slightly less significant total number of hours worked. This is important as previous studies have also concluded that job satisfaction is one of the main determinants of intended early retirement (Siegrist, et al, 2006). Job satisfaction is negatively related to the intention of early retirement- the more satisfied an individual is with her job, the less likely she is to retire. In addition, the magnitude of the coefficient does not seem to vary much when more control variables are added- it stays -0.111 though models 3-5, which makes it the coefficient with the highest magnitude in this regression.

In addition, it is interesting to observe, in a combination with Eurod and total hour worked per week, as variables like income and physical health seem to be less important for the decision of early retirement. The results show that the number of hours worked per week do have a significant influence on the intention of early retirement, however, the magnitude of the coefficient is really small- an increase of 10 hours per week would lead to an increase in the intention for early retirement of only 0.0127 (according to model 4), which is a considerably small effect.

Taking into account that the level of job satisfaction seems to greatly influence the intention of early retirement, it is important to mention the order in which the respective questions are asked in the survey itself. The question "Thinking about your present job, would you like to retire as early as you can from your job?" follows directly the question measuring job satisfaction. It does seem possible that issues can arise due to the way the survey is structured- it is likely that the fact that the question measuring job satisfaction is exactly before the one measuring the intention of early retirement might make the respondent overstate the influence of job satisfaction on the intention of early retirement. Due to this, the found effect of job satisfaction might be overstated, whereas the influence of other variables like health and well-being might be understated. One possible way to tackle this issue would be to change the order of the questions in the survey, so this is a suggestion for the design of the future waves of the survey.

For the following results estimated by gender, education level, income and age group, regression model 3 is chosen as the main regression model. The reason for this is that even though model 5 has more variables, none of the controls is significant or provides

more insight to the results. In addition, model 3 includes all variables of interest as well as the highly significant job satisfaction variable and the total hours worked per week, significant at the 5% level. In addition, the R-squared of model 4 is 0.031, which is one of the highest from the five models.

It is also important to mention that this panel regression has its limitations. As it can be seen in table 3, the number of observations ranges from 28,490 to 21,022 (21,036 for the main model of interest-model 3), whereas the number of individuals ranges from 16,034 and 14,959 (14,966 for mode 3). This implies that there are on average less than 2 observations per individual, even though only individuals that have participated in at least 2 waves of the survey were selected for this research. One of the main reasons for this is the age restriction that was imposed- only including individuals between 50 and 65-, for even though a participant has taken part in at least 2 waves of the survey, if in one or more of the waves a participant did not fall in this age range, it is possible that the observation from only one wave for that participant is included. In addition, it is also possible that for some variables there is not much variation over time, which could also have an adverse effect on the results of the panel regression with fixed effects. Nevertheless, fixed effects also have their advantage, as in this way the model controls for time-invariant factors. In order to investigate the impact of the above mentioned limitation on the results, a cross section analysis using the full sample of individuals (also including those that have participated in only one wave of the survey) is conducted. Its results can be found in the robustness check part of this section.

#### ii. Results by Gender

The results split by gender can be found in table 4. It can be observed that the results do differ based on gender. For females, the regression model shows that, surprisingly, depression symptoms do not seem to influence the intention of early retirement. This contradicts the main results, where Eurod is highly significant, and is also in contrast to what the results for males show. In addition, for females, the variable CASP, the measure of well-being, is significant at the 10% level and negatively related to the intention of early retirement- the more well-being the female respondent experiences, the less likely she is to have an intention for early retirement. The magnitude of the CASP coefficient is also nearly twice as high as the one in the main results (-0.00405 compared to -0.00228) and is also considerably higher than the coefficient for males- 0.000608.

Table 4- Results by Gender

VARIABLES	Female	Male
	Early Retirement	Early Retirement
MeetEnds	-0.00707 (0.0123)	0.0202* (0.0119)
Income_pct	-0.00433 (0.00355)	0.000645 (0.00343)
SPH	-0.00389 (0.0106)	-0.00727 (0.0103)
Chronic	0.000953 (0.0145)	0.0185 (0.0126)
CASP	-0.00405* (0.00216)	-0.000608 (0.00197)
Eurod	0.00772 (0.00501)	0.0205*** (0.00604)
Satisfied	-0.106*** (0.0139)	-0.116*** (0.0141)
Thw	0.000744 (0.000867)	0.00161** (0.000745)
Constant	0.368*** (0.107)	0.244** (0.102)
Observations	10,446	10,589
R-squared	0.028	0.037
Number of individuals	7,519	7,446

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Job satisfaction is also significant at the 1% level for females, implying that the less satisfied a female respondent is with her job, the more likely she is to look for early retirement, with a slightly lower magnitude of -0.106 compared to the main results (-0.111 and the results for males -0.1160. However, it is surprising to see that the number of hours worked per week does not influence the intention of early retirement, which contradicts the main results from table 4. The sign of the variable MeetEnds is also interesting, as for females it seems to be negative- the more difficultly the household faces in meeting ends, the less likely it is for females to retire earlier, whereas the opposite holds for males.

For the male participants in the survey, the results are more aligned to the main results. It can be seen that job satisfaction and depressive symptoms are highly significant and are the main determinants of the intention of early retirement. The more depressive symptoms a male participant experiences, the more likely he is to intend to retire earlier,

and in contrast, the more satisfied he is with his job, the less likely he is to intend to retire earlier. It is interesting to note that the coefficient of Eurod is 0.0205, which is higher than the coefficient in the main results- 0.0131, however the magnitude still stays rather low. The same holds for job satisfaction, where the coefficient in the main regression is -0.111 and for males it is slightly higher -0.116.

It can also be seen in table 5 that for males, total hours worked per week also has an impact on the intention of early retirement, significant at the 5% level. Surprisingly, for males the variable meet ends also shows to be significant at the 10% level and it is positively related to the intention of early retirement with a magnitude of 0.0202, which is considerably higher than the magnitude of the coefficient in the main results: 0.00715. This means that the more difficult it is to meet ends, the more likely the male participant is to intend to retire early.

In addition, it is interesting to note that the R-squared for males is higher than the one for females- 0.037 compared to 0.028. This implies that the model explains more the variation in the data for males compared to females. Moreover, the constant for females is higher than the ones for males- 0.368 and 0.244, which suggests that female participants are more likely to have an intention of early retirement than the male participants. This contradicts the results from Siegrist et al, (2006), which suggest that males are more likely to retire earlier than females.

### iii. Results by Education Level

In table 5 the results split by the three different education levels can be observed. The education classification includes three levels: “low”- pre-primary, primary, or lower secondary education; “medium” - secondary or post-secondary education; and “high”- first and second stage of tertiary education (Siegrist, et al, 2006).

It can be seen that the results of the different education levels do not differ much from each other or from the main results. However, the variable Eurod, which is significant at the 1% level in the main results, tends to be less significant in the different education levels. For the low and high level of education the depressive symptoms seem to be more important (as Eurod is significant at the 5% level), compared to the medium level of education, where Eurod is only significant at the 10% level. In addition, for the medium level of education the variable total hours worked is also significant on the 10%

level, which indicates that the number of hours worked per week could have some influence on the intention of early retirement, however, the magnitude of the coefficient is really low across all education levels. Again, job satisfaction is significant at the 1% level for all education levels, which means that it has a significant influence on the decision of early retirement. However, the magnitude of job satisfaction is the highest for the low educated- 0.149 which is higher than the main results (-0.111) and higher than the coefficient of both medium and high education levels. This finding, together with the very low magnitude of the coefficients of income and meet ends for the lower educated participants is surprising, as one would expect the lower educated individuals to be more concerned with income rather than job satisfaction.

Table 5- Results by Education Level

VARIABLES	Low Education Early Retirement	Medium Education Early Retirement	High Education Early Retirement
MeetEnds	-0.00266 (0.0185)	0.0104 (0.0135)	-0.000968 (0.0142)
Income_pct	-0.00297 (0.00500)	-0.000505 (0.00392)	-0.00266 (0.00428)
SPH	0.00404 (0.0155)	-0.0133 (0.0116)	-0.00545 (0.0125)
Chronic	0.0184 (0.0182)	0.0203 (0.0151)	-0.00294 (0.0175)
CASP	-0.00434 (0.00287)	-0.00221 (0.00233)	-0.000948 (0.00258)
Eurod	0.0157** (0.00766)	0.0106* (0.00621)	0.0167** (0.00688)
Satisfied	-0.149*** (0.0202)	-0.0901*** (0.0154)	-0.107*** (0.0171)
Thw	0.00158 (0.00110)	0.00160* (0.000943)	0.000741 (0.000945)
Constant	0.314** (0.144)	0.358*** (0.116)	0.188 (0.135)
Observations	4,925	8,774	6,818
R-squared	0.050	0.024	0.030
Number of individuals	3,515	6,405	4,675

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

It is also interesting to mention that the R-squared of the low education model is the highest- 0.05 which implies that the model explains the variation in the data more

compared to the models for the medium (0.024) and high education level. In addition, the constant of the medium educated participants is the highest- 0.358 compared to 0.314 and 0.188 for the low and high levels of education. This suggests that medium educated individuals are more likely to intend to retire earlier than low and high educated individuals.

iv. Results by Income Level

The results by level of income are presented in table 6. The results are split in three different income levels- low, medium and high, which contain income percentiles 1, 2, and 3; 4, 5, 6 and 7; 8, 9 and 10 respectively. It can be seen that the low income level contains only 2662 individuals, which is considerably less than the medium income group with 6209 and the high income group containing 8343 individuals. This is important to note, as it suggests that the predominant part of the sample consists of high income individuals, which can consequently make it less representative of the overall population of the countries in which the survey was conducted.

The results for the low income level differ significantly from the main results- depressive symptoms and total hours worked do not seem to play a role for the intention of early retirement, in contrast with the results for medium and high income individuals. Surprisingly, for the low income participant and well-being (CASP) is significant at the 5% level, negatively related to the intention of early retirement, however, the magnitude of the coefficient is rather low. Meet ends represent the difficulty individuals experience when the household is meeting ends, taking into account the total monthly income. The significance of meet ends can be explained by the difficulty low income people may experience when meeting ends within the household, compared to medium and high income people that do not seem to exhibit such issues, also taking into account that the magnitude of the coefficient- 0.0779 which is considerably higher than the coefficient for the other income levels and the main results (0.00715). In addition, well-being is also negatively related to the intention of early retirement, similar to the results for female individuals. This is in line with the study of Siegrist et al. (2006), however, well-being here is mainly significant for the low income people (and significant at the 10% level for the high income group), whereas in Siegrist et al. (2006) well-being seems to be influencing the intention of early retirement for individuals from all income groups. In addition, in these results the magnitude of CASP is very small. Moreover, the variable

satisfied is also highly significant across the income levels, though the coefficient does decrease in magnitude from low to high income. Nevertheless, the magnitude of job satisfaction is very high for the medium income level -0.178 and the low income level -0.120, and much lower for the high income level -0.0846. This is quite surprising as income is often expected to be of greater importance than job satisfaction for the low income individuals.

Table 6- Results by Income Level

VARIABLES	Low Income Early Retirement	Medium Income Early Retirement	High Income Early Retirement
MeetEnds	0.0779** (0.0320)	0.00953 (0.0193)	0.0130 (0.0141)
Income_pct	-0.00815 (0.0279)	-0.0139 (0.0124)	-0.0110 (0.0117)
SPH	-0.0405 (0.0302)	-0.0128 (0.0171)	0.00292 (0.0118)
Chronic	-0.0365 (0.0370)	0.0283 (0.0222)	-0.00771 (0.0153)
CASP	-0.00983** (0.00482)	0.00235 (0.00340)	-0.00407* (0.00236)
Eurod	0.00249 (0.0144)	0.0131 (0.00880)	0.0171*** (0.00654)
Satisfied	-0.120*** (0.0407)	-0.178*** (0.0225)	-0.0846*** (0.0164)
Thw	0.00226 (0.00198)	0.00304** (0.00145)	0.00184** (0.000891)
Constant	0.889*** (0.280)	0.0579 (0.180)	0.458*** (0.160)
Observations	2,986	7,395	10,655
R-squared	0.088	0.065	0.023
Number of individuals	2,662	6,209	8,343

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

For medium income individuals, the results are similar to the main results, as job satisfaction and total hour worked per week are significant. However, depressive symptoms do not seem to influence the intention of early retirement, which differs from the main results where Eurod is highly significant, even though the magnitude of the coefficient is the same for both regressions (0.0131). In contrast, depressive symptoms for the high income group play a major role in the decision for early retirement, as the more depressed an individual is, the more likely she is to have an intention of early

retirement, which supports the main results, with a coefficient that is slightly higher than the one of the main results (0.0171). Taking into account the fact that half of the sample is comprised from high income individuals, the similarity between the main results from table 4 and the results for high income individuals from table 6, suggests that the main result are likely to be driven by the answers of the high income group. As mentioned above, this can imply that the results are less representative for medium and low income individuals.

It is also interesting to observe that the constant from the low income model is very high compared to the constant for the medium and high income groups, which suggests that low income individuals are more likely to intend to retire earlier. Based on the constant, medium income participant are the least likely to have an intention of early retirement.

v. Results by Age Group

Table 7 shows the results split in three different age groups- 50-55, 55-60 and 60-65. This is done with the goal of investigating which factors are considered important by the different age groups when thinking about their intention of early retirement. This analysis does indeed show significant and interesting differences across the three age groups. The age group 50-55, which is also the largest of the three groups, shows that for this age group, only job satisfaction and income influence the intention of early retirement, and although income is significant only at the 10% level and its magnitude is rather small. However, it is surprising that the income percentile to which the participant belongs is significant, considering that income has not been significant in any of the other models. This suggests that for the age group 50-55, the higher the income percentile, the more likely the participant is to have an intention of early retirement, even though the magnitude of the coefficient is quite small. This is in contrast with what we observe for the age group 55-60 and 60-65, where income is negatively related to the intention of early retirement, which confirms the main results and suggest that the higher the income percentile the individuals belongs to, the less likely she is to retire earlier, even though the magnitude of the coefficient is rather small.

Table 7- Results by Age Group

VARIABLES	Age 50-55	Age 55-60	Age 60-65
	Early Retirement	Early Retirement	Early Retirement
MeetEnds	-0.00352 (0.0182)	0.0166 (0.0201)	0.0417 (0.0338)
Income_pct	0.0109* (0.00579)	-0.00274 (0.00614)	-0.0247*** (0.00952)
SPH	-0.00351 (0.0174)	-0.00848 (0.0175)	0.0330 (0.0323)
Chronic	0.0288 (0.0264)	-0.0108 (0.0234)	0.0183 (0.0355)
CASP	-0.00222 (0.00321)	-0.00632* (0.00326)	-0.00138 (0.00560)
Eurod	0.000678 (0.00848)	0.0247** (0.00968)	0.0147 (0.0158)
Satisfied	-0.0961*** (0.0205)	-0.108*** (0.0241)	-0.0909** (0.0444)
Thw	0.000430 (0.00118)	-0.00251 (0.00175)	0.00395* (0.00235)
Constant	0.268* (0.161)	0.667*** (0.183)	0.230 (0.297)
Observations	8,581	8,710	4,020
R-squared	0.025	0.044	0.058
Number of individuals	7,384	7,712	3,674

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The results for the age group 55-60 are the most aligned with the main results, except that the magnitude of Eurod is slightly greater than the coefficient in the main results, and the coefficient for job satisfaction is slightly lower. Moreover, CASP also seems to have an effect but the magnitude of the coefficient is really low, thus it hardly has an impact on the intention of early retirement for the age group 55-60.

In addition, for the age group 60-65, job satisfaction shows to be significant only at the 5% level with a magnitude of -0.0909, which is also lower than the coefficient of the main results- 0.111. This implies that the level of job satisfaction is less important for the individuals in the age group 60-65 than it is for the other age groups. In addition, total hours worked is also slightly significant, which implies that the number of hours worked per week do have an influence on the intention of early retirement, however, the coefficient is too small to have a real impact on the intention of early retirement.

vi. Robustness Checks

Logit Model

In order to check the robustness of the results, a logit model is used to estimate the main results. In a logit model the dependent variable (intention for early retirement) cannot take values higher than 1 or smaller than 0 and it allows for nonlinear effects, which is not the case with a linear probability model, used up to now. However, when the logit regression was run, a number of observations were dropped out because for some individuals there appear to be less than two observations even though they have participated in at least two survey waves.

Table 8- Logit Model

VARIABLES	Logit Model Early Retirement
MeetEnds	0.0318 (0.0629)
Income_pct	-0.0136 (0.0186)
SPH	-0.0354 (0.0534)
Chronic	0.0813 (0.0653)
CASP	-0.0157 (0.0111)
Eurod	0.0797*** (0.0260)
Satisfied	-0.738*** (0.0714)
Thw	0.00795* (0.00411)
Observations	3,474
Number of individuals	1,522

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Regardless of the low number of observations, the significance level and sign of the main variables of variables of interest does not change much compared to the main results. The two variables that are significant at the 1% level in table 4 are also significant in the logit model. Also, more job satisfaction is associated with a lower likelihood of intended early retirement, and more depressive symptoms are also associated with a higher likelihood of intended early retirement. One minor difference between the main results and the results from the logit model is the significance of the variable total hours worked. In the main results, it is significant on the 5% level, whereas in the logit model it

is only significant at the 10% level. These findings confirm the main results from this study.

### Sensitivity Analysis for the Exclusion of Countries

In order to check the robustness of the results, a robustness check is performed in which one country is being excluded from the sample, after which the main regression is estimated again. This is done for every country, with the goal of checking whether one or more countries might significantly influence or change the results. This is also done to check whether the missing observations for some countries (due to the fact that the particular question was not asked in some of the wave in some countries) are problematic.

Table 9a- Sensitivity Analysis by Excluding One Country at a Time

VARIABLES	Full Sample Early Retirement	Excluding Austria Early Retirement	Excluding Belgium Early Retirement	Excluding Czech Early Retirement	Excluding Switzerland Early Retirement	Excluding Germany Early Retirement	Excluding Denmark Early Retirement	Excluding Estonia Early Retirement	Excluding Spain Early Retirement
MeetEnds	0.00715 (0.00855)	0.00790 (0.00923)	0.00946 (0.00869)	0.00919 (0.00869)	0.00862 (0.00885)	0.00204 (0.00889)	0.00261 (0.00920)	0.00873 (0.00863)	0.00413 (0.00878)
Income_pct	-0.00164 (0.00247)	0.000609 (0.00267)	-0.00163 (0.00251)	-0.00180 (0.00252)	-0.00169 (0.00260)	-0.00142 (0.00259)	-0.00225 (0.00258)	-0.00203 (0.00250)	-0.00133 (0.00251)
SPH	-0.00563 (0.00741)	-0.000395 (0.00782)	-0.00394 (0.00746)	-0.00590 (0.00747)	-0.0104 (0.00767)	-0.00545 (0.00762)	-0.00538 (0.00811)	-0.00457 (0.00747)	-0.00594 (0.00757)
Chronic	0.0117 (0.00951)	0.0177* (0.0102)	0.0155 (0.00967)	0.00535 (0.00963)	0.0110 (0.00978)	0.00620 (0.00992)	0.0129 (0.0102)	0.0109 (0.00957)	0.0104 (0.00983)
CASP	-0.00228 (0.00146)	-0.00238 (0.00157)	-0.00274* (0.00149)	-0.00144 (0.00148)	-0.00106 (0.00150)	-0.00185 (0.00152)	-0.00244 (0.00153)	-0.00216 (0.00146)	-0.00206 (0.00150)
Eurod	0.0131*** (0.00385)	0.0142*** (0.00412)	0.0130*** (0.00389)	0.0126*** (0.00392)	0.0121*** (0.00403)	0.0120*** (0.00398)	0.0164*** (0.00412)	0.0128*** (0.00390)	0.0130*** (0.00401)
Satisfied	-0.111*** (0.00990)	-0.110*** (0.0108)	-0.112*** (0.0101)	-0.110*** (0.00999)	-0.112*** (0.0103)	-0.112*** (0.0101)	-0.112*** (0.0107)	-0.113*** (0.01000)	-0.116*** (0.0101)
Thw	0.00124** (0.000569)	0.00148** (0.000611)	0.00127** (0.000576)	0.00122** (0.000572)	0.000993 (0.000608)	0.00116* (0.000598)	0.00100* (0.000596)	0.00128** (0.000572)	0.00137** (0.000599)
Constant	0.302*** (0.0740)	0.272*** (0.0793)	0.314*** (0.0751)	0.281*** (0.0751)	0.295*** (0.0762)	0.273*** (0.0763)	0.303*** (0.0779)	0.312*** (0.0748)	0.261*** (0.0765)
Observations	21,036	18,810	19,877	19,793	19,147	19,931	18,907	19,561	19,977
R-squared	0.031	0.031	0.032	0.030	0.031	0.030	0.033	0.032	0.033
Number of individuals	14,966	0.031	14,011	13,927	13,624	14,302	13,672	13,596	14,189

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

It can be seen in table 9a and 9b that the results do not differ considerably from the main results- the variables satisfied and Eurod are always significant at the 1%, their signs do not change and the magnitude of the coefficients does not vary much across countries. The variable total hours worked per week is also mostly significant at the 10%

level, sometimes at the 5% level, with some exceptions, like the models in which Switzerland (table 9a), and Sweden (table 9b) are excluded. In addition, well-being (CASP) also seems to vary between the models, as it becomes slightly significant in the models which exclude Austria (table 9a), the Netherlands (table 9b) and Sweden (table 9b).

Overall, it can be concluded based on the robustness check with a logit model and the country sensitivity analysis, that the results of the panel regression are robust.

**Table 9b- Sensitivity Analysis by Excluding One Country at a Time**

	Full Sample Early Retirement	Excluding France Early Retirement	Excluding Greece Early Retirement	Excluding Italy Early Retirement	Excluding Israel Early Retirement	Excluding The Neth. Early Retirement	Excluding Poland Early Retirement	Excluding Sweden Early Retirement	Excluding Slovenia Early Retirement
MeetEnds	0.00715 (0.00855)	0.00204 (0.00889)	0.00261 (0.00920)	0.00873 (0.00863)	0.00413 (0.00878)	0.0101 (0.00903)	0.00600 (0.00866)	0.00721 (0.00912)	0.00712 (0.00858)
Income_pct	-0.00164 (0.00247)	-0.00142 (0.00259)	-0.00225 (0.00258)	-0.00203 (0.00250)	-0.00133 (0.00251)	-0.00183 (0.00260)	-0.00130 (0.00250)	-0.00117 (0.00257)	-0.00173 (0.00248)
SPH	-0.00563 (0.00741)	-0.00545 (0.00762)	-0.00538 (0.00811)	-0.00457 (0.00747)	-0.00594 (0.00757)	-0.00893 (0.00793)	-0.00366 (0.00748)	-0.0109 (0.00803)	-0.00532 (0.00742)
Chronic	0.0117 (0.00951)	0.00620 (0.00992)	0.0129 (0.0102)	0.0109 (0.00957)	0.0104 (0.00983)	0.0128 (0.0102)	0.0113 (0.00957)	0.0165 (0.0103)	0.0114 (0.00952)
CASP	-0.00228 (0.00146)	-0.00185 (0.00152)	-0.00244 (0.00153)	-0.00216 (0.00146)	-0.00206 (0.00150)	-0.00320** (0.00151)	-0.00213 (0.00148)	-0.00321** (0.00152)	-0.00233 (0.00146)
Eurod	0.0131*** (0.00385)	0.0120*** (0.00398)	0.0164*** (0.00412)	0.0128*** (0.00390)	0.0130*** (0.00401)	0.0116*** (0.00407)	0.0137*** (0.00391)	0.0115*** (0.00406)	0.0131*** (0.00387)
Satisfied	-0.111*** (0.00990)	-0.112*** (0.0101)	-0.112*** (0.0107)	-0.113*** (0.0100)	-0.116*** (0.0101)	-0.105*** (0.0105)	-0.113*** (0.0100)	-0.110*** (0.0105)	-0.112*** (0.00993)
Thw	0.00124** (0.000569)	0.00116* (0.000598)	0.00100* (0.000596)	0.00128** (0.000572)	0.00137** (0.000599)	0.00126** (0.000594)	0.00116** (0.000575)	0.000888 (0.000593)	0.00124** (0.000570)
Constant	0.302*** (0.0740)	0.273*** (0.0763)	0.303*** (0.0779)	0.312*** (0.0748)	0.261*** (0.0765)	0.378*** (0.0777)	0.280*** (0.0750)	0.374*** (0.0778)	0.299*** (0.0741)
Observations	21,036	19,931	18,907	19,561	19,977	19,273	20,617	19,046	20,714
R-squared	0.031	0.030	0.033	0.032	0.033	0.030	0.031	0.030	0.033
Number of individuals	14,966	14,302	13,672	13,596	14,189	13,927	13,624	14,302	13,672

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Cross Section Analysis

Table 10 contains the cross section analysis of the data, which is conducted in order to check whether the main results are robust when the whole sample of individuals a (also including those who have participated in only one wave of the survey) and countries (also including Portugal and Hungary) is used. In total, the sample for the cross section includes 26,840 observations for the main model used throughout this research

(which compares to 14,966 observations for the panel regression) and 26,126 for the second model, which also includes additional control variables.

It is interesting to observe that the results differ considerably from the main results of the paper- in model 1 the variables meet ends (MeetEnds), self-reported health (SPH), well-being (CASP), depressive symptoms (Eurod), job satisfaction (Satisfaction) and total number of hours worked per week (Thw) are all significant at the 1% level. In addition, the magnitude of the coefficients is also different- job satisfaction has a magnitude of - 0.163 which is higher than -0.111 in the main results. In addition, there is a considerable increase in magnitude for meet ends (0.0288 compared to 0.00715 in the main results) and self-reported health (-0.0349 compared to -0.00563 in the main results). There is also a slight increase in magnitude of CASP and Thw but these variables still have very low coefficients which makes their impact on the intention of early retirement very little. Some possible explanations for why the cross-section results deviate from the results of the main model are the following. Whereas the panel regression estimates the effects of changes over time in various factors for specific individuals (intrapersonal), the cross-section regression looks at variation between individuals (interpersonal), and it cannot be excluded that interpersonal effects simply differ from intrapersonal effects. Another explanation may be that due to the somewhat limited variation in the panel regressions, the panel regression was not able to capture all relevant effects adequately.

Model 2 from table 10 also yields interesting results- the magnitude of most of the significant variables in model 1 decreases, however, the additional control variables show to be significant, and the country dummies seem to have a significant impact on the intention of early retirement. Gender, education level and employment have a significant and negative impact on the intention of early retirement, with magnitude of, respectively 0.0202, 0.0296 and 0.0406. This suggests that they also have an impact on the intention of early retirement, even though with relatively low magnitude.

Table 10-Cross Section Analysis

VARIABLES	(1) Early Retirement	(2) Early Retirement
MeetEnds	0.0288*** (0.00362)	0.00866** (0.00394)
Income_pct	-0.000132 (0.00112)	-0.00112 (0.00113)
SPH	-0.0349*** (0.00339)	-0.0367*** (0.00348)
Chronic	0.00574 (0.00359)	0.0123*** (0.00357)
CASP	-0.00648*** (0.000670)	-0.00631*** (0.000684)
Eurod	0.00629*** (0.00175)	0.00991*** (0.00179)
Satisfied	-0.163*** (0.00457)	-0.149*** (0.00461)
Thw	0.000577*** (0.000207)	0.000496** (0.000223)
EMP		-0.0406*** (0.00384)
Wave		-0.000674 (0.00258)
Female		-0.0202*** (0.00631)
Age		-0.00585*** (0.000803)
Education level		-0.0296*** (0.00236)
Smoking		0.00500 (0.00668)
Drinking		0.00779*** (0.00158)
Vigorous Activities		-0.00477** (0.00234)
Germany		-0.0631*** (0.0181)
Sweden		-0.129*** (0.0166)
The Netherlands		-0.177*** (0.0163)
Spain		0.0647*** (0.0190)
Italy		0.00162 (0.0185)
France		0.0454*** (0.0163)
Denmark		-0.111*** (0.0158)

Greece		0.0233 (0.0198)
Switzerland		-0.168*** (0.0157)
Belgium		-0.181*** (0.0154)
Israel		-0.183*** (0.0252)
Czech		-0.0821*** (0.0167)
Poland		0.0576** (0.0239)
Hungary		0.136*** (0.0235)
Portugal		0.0232 (0.0282)
Slovenia		0.212*** (0.0237)
Estonia		-0.305*** (0.0168)
Constant	0.377*** (0.0330)	0.838*** (0.0577)
Observations	26,840	26,126
R-squared	0.093	0.156

<sup>1</sup>Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

One of the most interesting findings of the cross section analysis is the impact the countries have on the intention of early retirement- the countries from Western and Central Europe (including Estonia and Israel) suggest to have a negative effect on the intention of early retirement, whereas Southern and Eastern European countries tend to have a positive impact on the intention of early. In addition, countries like Estonia, Israel, Belgium, Switzerland, Denmark, the Netherlands and Sweden have coefficients ranging from 0.305 till 0.111, which means that they have a bigger impact on the intention of early retirement than any of other variables (except job satisfaction). Moreover, the individuals from countries like Slovenia and Hungary are respectively 0.212 and 0.136 more likely to have an intention for early retirement. These findings are similar to the findings of Siegrist et al. (2006), which results also suggest that the intention of early retirement varies greatly across Europe. This implies that institutional influences and retirement policies might have a greater impact on the intention of early retirement than any

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<sup>1</sup> Ireland and Luxemburg are excluded due to collinearity; and Austria is taken as a base country

individual factors. This is an important finding for policy makers as this shows the importance of retirement-related policies. These findings are also supported by previous research on old age labour force participation across Europe- the research of Borsch-Supan (2000). His findings suggest that the strength of the incentive effects on old age labour supply have a significant impact on the labour supply in countries in Western and Northern Europe, which leads to a higher labour supply at an older age, whereas the policies of other European countries provide strong incentives for early retirement. This makes the relation between early retirement and its institutional determinants across Europe an interesting field for further research.

## VI. Conclusion and Discussion

This bachelor thesis investigated the effect of health, well-being and income on the intention of early retirement among individuals in the age 50-65, using data from the SHARE survey dataset. The focus of the SHARE data is on nineteen European countries and Israel. This study conducted a panel data analysis using fixed effects, in order to look at the changes in variables over the different waves of the SHARE survey. The results have been split into main results, results by gender, education level, income level and age group, in order to check for possible variation across the different groups. In addition, robustness checks were conducted- one using a logit model, a sensitivity analysis for excluding one country at a time and a cross section analysis.

The main findings of this bachelor thesis suggest that the main factors that influence the intention of early retirement are job satisfaction, depressive symptoms and the total hours worked per week. These findings partially support the results of Siegrist et al, (2006), where the quality of work, in terms of job satisfaction and work-reward balance, together with well-being are reported as the main factors that influence the intention of early retirement. Nevertheless, the results of this thesis also suggest that well-being can have an influence on the intention of early retirement, however, the effect and magnitude of this influence does not appear to be strong. The number of depressive symptoms is an interesting variable as the causal direction is not clear: it can directly influence the intention of early retirement or it can influence it via job satisfaction, for example. Previous studies on depression and work have shown that high levels of psychological demand and stress can cause depressive symptoms among adults (Niedhammer,

Goldberg, & Leclerc, 2003). Another research on the topic has indeed found a relation between depression and early retirement, more specifically that depressed individuals retire on average 1.5 years earlier than non-depressed individuals (Karpanalo, et al., 2004).

The results also vary based on gender, education level, income level and age groups. Siegrist et al. (2006) suggests that men are more likely than women to have an intention of early retirement, however, this thesis finds that men are less likely to intend to retire earlier. Also, the factors that influence the intention for men and women seem to differ. For the female participants of the survey, the job satisfaction and well-being are the only ones that seem to influence their intention of early retirement, whereas for males, job satisfaction, depressive symptoms and the ability of the household to meet ends influence the intention of early retirement. This can be attributed to the fact that males are more often the main earner in a household so they carry more financial responsibility for sustaining the household. The results based on education level do not seem to differ much among the different levels or from the main results. However, it is interesting to note that highly educated individuals are more likely to have an intention of early retirement. Based on the income level, there is more variation among the results. For low income groups the intention of early retirement is influenced by job satisfaction, well-being level and the ability of the household to meet ends, something that does not seem to occur for other income groups. For medium and high income groups, the results show that job satisfaction and the number of total hours worked influence the intention of early retirement, however, for high income groups depressive symptoms and well-being are also important factors. In addition, the magnitude of the variable total number of hours worked per week is so small that it hardly has an impact on the intention of early retirement. It is also important to mention that half of the overall sample belongs to the high income group of individuals, which could possibly make the results less representative for the lower income groups. With regards to age, there is a slight variation across the results- for the age group 50-55 and 60-65 job satisfaction and the income percentile seem to be the main determinants of the intention of early retirement, which is surprising to see as income was not significant in any of the other results. For the age group 55-60 the main factors that influence the intention of early retirement are job satisfaction, depressive symptoms and to a lesser extent well-being, which is line with the main results.

To answer the research question, the main variables that stand out as factors that influence the intention of early retirement are job satisfaction, depressive symptoms and number of hours worked, with income and physical health having little or no influence on the intention of early retirement. This is interesting to observe as income and physical health had been reported as main determinants of early retirement in previous literature (Bazzoli, 1985). These findings give rise to policy suggestions and suggestions for employers that want to encourage labour force participation at an older age. Improved conditions and effort-reward balance (Siegrist, et al, 2006), as well as reduced number of hours worked per week could encourage labour force participation among the older European workers.

The main advantage of this thesis over previous research and the research of Siegrist et al., (2006) is that this study estimates the change over time by using four different waves of the SHARE survey and panel data analysis, whereas the Siegrist et al. uses data from only one wave. This makes the results more up to date, and as it can be seen, it deems also other factors as important determinants of the intention of early retirement, like depressive symptoms and total hours worked per week. However, the use of panel regression is also the main weakness and limitation of this research. Even though panel regression with fixed effects has the advantage of controlling for country-specific time-invariant factors, it also limits considerably the sample size and number of countries used for this research. In addition, the results from the cross section analysis presented in the robustness check part of this paper differ considerably from the panel regression results. This might mean either that a cross-section analysis is more suitable for the data of the SHARE survey, as there seem to be only few observations per individual and too little change in some of the variables over time in the employed sub-set of the SHARE data for a panel regression analysis, or that the intrapersonal effects estimated by the panel regressions simply differ from the interpersonal effects estimated by the cross-section regression.

In addition, as this research makes use of data from the SHARE survey, the variables and predictions are based on self-reported data, which is not always reliable. It is possible that respondents with reduced well-being, for example, are more likely to report their work as stressful or to be less satisfied with their work, or respondents that have an intention of early retirement to justify their reasoning by reporting low job satisfaction

(Siegrist, et al, 2006). Another possible limitation of this study is the way the SHARE questionnaire is designed, as the question measuring job satisfaction is right before the question measuring the intention of early retirement. This can amplify the effect of the level of job satisfaction on the intention of early retirement, while the effect of other factors is decreased. Another limitation of this research is that it uses only easySHARE data, which is a simplified version of the original SHARE dataset. This implies that not all variables are present in the easySHARE dataset, for example the variable measuring the effort-reward balance that the individuals experience in their work is only included in the detailed SHARE dataset, and it might have been interesting to include it as a variable in the main model of this research. Another limitation of this research is the fact that some of the variables of interest might be correlated due to which the coefficients might be imprecisely estimated. For example, depressive symptoms and job satisfaction can influence each other, as low job satisfaction can lead to more depressive symptoms, and the other way around. This may render their coefficient estimates somewhat imprecise.

Suggestions for further research are the use of cross section analysis instead of panel regression, or the use of more survey waves if panel analysis is used. This could possibly alleviate the issue of a reduced sample size, few observations per individual and exclusion of countries, which are the main limitation of this paper. In addition, future research could investigate in more detail the country-specific factors that influence the intention of early retirement and how they vary across Europe, for example, by looking at retirement policies and the strength of the incentive effects on old age labour supply. Moreover, later research could investigate the differences across less developed countries in Eastern Europe compared to Western countries and whether the same factors influence the intention of early retirement in those countries, or that other variables play a role. It is also recommended for further research to make use of the complete SHARE database as it contains more information than the easySHARE version. In addition, more information on the work situation and working conditions of the participants is desirable, as this could give more clarity on what the most important work-related factors are that influence the intention of early retirement. Moreover, further research could focus in detail on the underlying mechanisms of the effects found in this model, like investigating via what ways the main factors that have shown to influence the intention of early retirement do so.

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