Netspar

NETSPAR ACADEMIC SERIES

Retirement effects on health

Mojib Saree

MSc 06/2019-007

Master Thesis, Mojib Saree, S1408801

door Mojib Saree

Datum van inzending: 11-jun.-2019 11:33PM (UTC+0200)
Inzending-ID: 1142668621
Bestandsnaam: Mojib_2.docx (194.09K)
Aantal woorden: 14572
Aantal tekens: 82350

Universiteit Leiden

Master's Thesis – MPA: Economics and Governance

Retirement effects on health

Name: Mujibrhman Sanni

Student Number: 1408851

Supervisor: Eduard Suari Andreu

Executive Summary

In this study I have attempted identify the causal effect of retirement on both the physical and mental health of individuals. This effect is examined in a multi-country setting over a period of 14 years. For this study the Survey of Health, Ageing and Retirement in Europe is used, it provides me with detailed information on various health, behavioural and demographic indicators for various countries in over a period of time. I have added to this dataset information of the statutory retirement ages of 19 European countries and Israel using the OECD database. The different statutory retirement ages in these countries is used as an instrumental variable to estimate the causal effect of retirement on both physical and mental health. This instrumental variable has both a time and country effect. On the one hand, exogenous variation in statutory retirement ages within each is exploited, and on the other hand the time effect since a period of 14 years is examined.To my knowledge no other study has exploited both effects in this setting. Furthermore, this study will both capture the effect of the decision to retire and the short-term effects on health after retirement. Because individuals will not be excluded from the dataset once they retire. This will allow me to also capture the post short term effect of retirement on health, since individuals will be analysed over a course of more than 14 years.

The main findings identify mixed results. In case of physical of health, only one of the three indicators have a statistically significant effect. Based on this indicator, individuals experience an improvement of almost 5% in their self-perceived health after retirement. For mental health only the EURO-D depression scale identifies a statistically significant effect and shows a decrease of almost two points. Thus, indicating that retirement has a positive effect on the mental health of individuals.

However, when only focusing on Germany, Sweden, Denmark, Switzerland, Belgium and the Netherlands, more consistent results can be identified. For physical health all the indicators identify a health improvement after retirement and are statistically significant. Individuals experience 23% less limitations with activities of daily living, experience almost 10% less arm function and fine motor limitations and an 40% improvement in their self-perceived health. For mental health the findings are mixed. On the one hand, individuals score almost

6.5 points less in quality of life index. Thus, suggesting a significant deterioration of mental health after retirement. However, this indicator has a high robust stand error of above 1. The findings of the EURO-D depression indicate a decrease of more than one point. Thus, suggesting that retirement induces a considerable improvement in the mental health of individuals.

Table of content

1.Introduction

On a social economic level, the Dutch pension system can be considered 'unique', it has many features that many other countries do not have. The second pillar, in which employees build up a supplementary pension, is much bigger in comparison to other countries. Furthermore, more than 90% of the employees in the Netherlands fall under an obligatory supplementary pension system (Goudswaard, 2014). Also, the Dutch pension funds have a staggering capital of 181 % of the GDP (Boschman, 2017). Nevertheless, the are many voices advocating for a systematic reform of the current pension system. Partially, this can be explained by that fact that most of our pensions have a defined- benefit character. This means that pension payments are predetermined, and the contributions can vary. In this way the risks are pooled between the contributors and different generations. However, pension funds are facing increasing difficulties in coping with these risks. Adjusting the contributions for the rising life expectancy and financial setbacks is becoming more and more difficult. The main reason for this is the decreasing number of contributors. Due to the aging of our society and the low birth rate the number of pensions is increasing in comparison to the contributors (Goudswaard, 2014). Another issue here is the rising collective health costs in the Netherlands. The current growth of this costs is higher than our economic growth, and therefore voices have surfaced questioning the sustainability of this system (Rijksoverheid, 2012). The Dutch government has started implementing policies to increase the retirement age and to link it with the life expectancy rate. The rationale behind these policies is that it would solve both problems. On the one hand, it would increase the income of pension funds and decrease their costs. On the other hand, government would generate more income to finance the rising health costs. The core assumption of this policy is that retirement does not have a negative effect on the health of individuals after retirement. Therefore, it can be very interesting to identify the effect of retirement on health. The focus of this thesis will be on mapping the effect of retirement on health. Health will be analysed from an economic perspective. The following research question is formulated:

'What is the effect of retirement on the physical and mental health of individuals aged 50+'

The idea that retirement has a negative effect on health has a long history (Minkler, 1981). Furthermore, many argue that retirement in itself is an aggravating process. The social environment in which one lives changes in this process. Consequently, leading to breaks with

friends, colleagues. And this in turn can lead to both mental and emotional difficulties (Coe & Zamarro, 2011). However, there are also many voices that claim the opposite. From their perspective individuals experience work as stressful. Hence, retirement will relieve this stress and positively affect the health of individuals (Coe & Zamarro, 2011). However, there is no concrete evidence that would support any of these two camps. The crux here is the problem of reversed causality, poor health conditions of individuals can affect their decision to retire. Therefore, retirement is often a choice and based on health conditions of individuals before retirement. Many studies do not take this into consideration, namely that health condition of individuals plays a role in their decision to retire. Therefore, these studies can only infer correlation, not causality.

However, there are also some studies that try to tackle the endogeneity of the retirement decision of individuals. Coe and Londerboom (2008) use age-specific retirement incentives as an instrumental variable to map the causal mechanism of retirement on health. Specifically, they use the early retirement offer as an instrument for retirement. They find no negative effects of early retirement of male individuals health. They even find improvement in health of highly educated individuals and a temporary improvement in the self-reported health of individuals. However, these findings are found in the United States, and therefore cannot simply be extrapolated to Europe. Since, the social arrangements, health insurance systems and labour markets differ significantly between these two continents.

In this study I will examine the effect of retirement on both the physical health and mental health, both subjective and objective health indicators will be used. I will examine these effects in a multi-country setting and over a period of several years. For this study the Survey of Health, Ageing and Retirement in Europe will be used, it provides me with detailed information on various health, behavioural and demographic indicators for various countries in over a period of time. I have added to this dataset information of the statutory retirement ages of 19 European countries and Israel using the OECD database.

The different statutory retirement ages in these countries will be used as an instrumental variable to estimate the causal effect of retirement on both physical and mental health. This instrumental variable has both a time and country effect. On the one hand, exogenous variation in statutory retirement ages within each country will be exploited, and on the other hand the time effect since a period of 14 years will be examined and variation over this time period will be exploited. To my knowledge no other study has exploited both effects in this

setting. Furthermore, this study will both capture the effect of the decision to retire and the short-term effects on health after retirement. Because individuals will not be excluded from the dataset once they retire. This will allow me to also capture the post short term effect of retirement on health, since individuals will be analysed over a course of more than 14 years.

The economic "Health Investment" model of Grossman (1972) will function as the theoretical backbone of the thesis, and therefore this thesis will contribute on the existing economic scientific knowledge. In this model health is considered as an economic commodity. Health functions as an economic commodity in both the demand and supply sphere. Furthermore, the results of this thesis will contribute on presenting possible solutions to the current retirement and collective health costs issues.

This study is structured as follows; first a literature study will be performed in in which all the relevant literature will be analysed. Then a institutional context for the Netherlands will be presented. Furthermore, a theoretical framework will be constructed. Thereafter a chapter will be dedicated to methodology, data and conceptualization of the variables into measurable indicators. Thereafter, the results of the study will be presented. Finally, an extensive conclusion and policy recommendations will be presented.

2. Literature Study

Grossman (1972) argues that health is both a consumption- and investment good. On the one hand, individuals consume health by simply 'feeling good.' And on the other hand, health enables individuals to participate in the labour market. While an individual's knowledge stock as an effect on productivity, the health stock determines how much time an individual has at his disposal for labour and leisure (Grossman, 1972). He identifies health as an output and medical services as one of the input variables that determines this output. The dual function of health functions as the reason for Grossmann to construct a model that illustrates the demand for health (Grossman, 1972). The main assumption of this model entails that health is a sustainable capital good that produces 'healthy time' as output. Individuals are born with an x amount of health stock, which increasingly depreciates with age and appreciates by investing in health. Once the health stock of an individual depletes it results into death.

Grossman distinguishes two aspects in the decision-making mechanism of individuals concerning investing in health. On the one hand, individuals have a "consumption motive", this entails that individuals experience utility in simply feeling healthy. On the other hand, individuals have an "investment motive", this entails that a good health enables individuals to participate in market and non-market activities (Grossman, 1972). These two aspects have a negative relationship, an increase in the former results in a decrease in the latter. The preferences of individuals change as the years pass by. As individuals grow older the "investment motive" dwindles and the "consumption motive" grows stronger. This can be explained by the fact that the marginal utility of health increases as individuals grow older (Grossman, 1972).Individuals have at the start of their life cycle a low marginal utility for health and big number of years to live, as the individuals grow older the opposite applies (Dave et al., 2008).

Furthermore, the Grossman model implies that wages have a positive effect on the health stock. Higher wages mean that the marginal product of a x amount of labour increases and this means that an individual has a higher income to invest in health (Grossman, 1972). Also, the education level of individuals has a positive effect on the health stock. This effect is twofold; on the one hand, higher educated individuals have a healthier lifestyle, and this translates into a higher health stock. On the other hand, education level has a positive effect on the productivity of individuals in market and non-market activities and this results in a higher marginal product of health and this means a higher health stock (Grossman, 1972).

Finally, the ever-decreasing investment motive and ever-increasing marginal utility of health implies that the health stock will decrease after retirement results in an overall decrease of health (Grossman, 1972).

Halliday et al. (2009) build further on the Grossman model and attempt to map the decision-making mechanism of individuals investing in health and the utility of it. They add retirement to the model and identify the effect of this new variable. Their model attempts to estimate how the supply of labour, consumption, investment- and consumption motive and the health stock of individuals develop during the lifecycle (Halliday et al. (2009). The authors use the 'Panel Study of Income Dynamics' for the years 1968-2005. They conduct a linear fixed effects regression to estimate the causal effects of age on the health stock, income and consumption of individuals. Their findings indicate that the investment motive is almost three times higher than the consumption motive at the age twenty. However, the investment motive decreases as the years pass and completely depletes after retirement. The consumption motive on the other hand shows an everlasting increase as the years pass. As individuals grow older their health deteriorates and the marginal utility of health increases. At the same time the number of years that an individual can offer for labour decreases as retirement looms. Consequently, the consumption motive catches up with the investment motive at the age of 45 and increases farther as individuals grow older. The investment motive completely depletes after retirement. This means that after retirement individuals only invest in health from the consumption motive perspective, which in his turn is fuelled by the ever-increasing marginal utility of health (Halliday et al., 2009). This process has several implications for the health stock of an individual; on the one hand, the health stock of individuals decreases because individuals only invest in health from the consumption motive perspective. On the other hand, the health stock decreases because the marginal utility of health increases (Halliday et al., 2009).

Dave et al. (2008) conducted an extensive study on the effects of retirement on both the physical and mental health. The theoretical framework has his fundaments in the Grossman model, and from this paradigm they conduct their research (Dave et al., 2008). They attempt to estimate the causal effects of retirement on both the physical and mental health of individuals. The authors use a comprehensive longitudinal dataset with more than 77000 observations. To tackle the reversed causality problem they conduct fixed effects regressions to map the causal effects of retirement on the physical and mental health of individuals. They

also add various control variables to their model to control for omitted variable bias (Dave et al., 2008). Their findings indicate that retirement has a negative effect on both physical and mental health. Mobility of individuals decreases with 34% after retirement. Furthermore, they find 7.9 % increase in illnesses, 11.4% increase in psychological conditions and 14.5 increase in the CES depression scale. These findings are all statically significant (Dave et al., 2008).

However, their method only controls for unobserved heterogeneity and does not solve the revered causality problem. The authors control for this using a sample that only consists of individuals that were both physically and mentally healthy at moment of retirement. The effects of retirement indeed attenuate but remain considerable and statistically significant. Mobility of individuals decreases with 22,3%, illnesses increase with 6.4% and they find a decrease of 9.2 % in the mental health of individuals on the CES depression scale (Dave et al., 2008). To make the causal mechanism of retirement more robust the authors examine the health of individual that go on part-time retirement. If there is indeed a negative causal relationship between retirement and health, this effect should be present when individuals go on part-time retirement. Because for individuals who work part-time both the consumption and investment motive remains active, and from both motives individuals invest in their health stock (Dave et al., 2008). And indeed, no significant effect on health is witnessed when they only focus on this group of individuals. Furthermore, they find that the effects of retirement manifest differently per gender. Retirement seems to particularly deteriorate the physical health of men and women seem to particularly suffer in the mental health sphere (Dave et al., 2008). Furthermore, the authors witness that the health decline for individuals that live alone is considerable higher in comparison of those that life with a partner. This is a causal effect.

Van Solinge (2005) focuses in her study on health of individuals when they make the transition from working life to retirement. She applies both descriptive statistics and multivariate analyses to map the transition mechanism from working life to retirement. The goal is not to only determine whether retirement as an effect on health, but she also attempts to explain what circumstance bring this effect about (Van Solinge, 2005). She uses a dataset from the Dutch Interdisciplinary Demographic Institute for the years 1995-2001. This longitudinal data consists of around 800 individuals aged 55+ working for Unilver and Bijenkorf providing information on numerous income, health and demographic variables.

This dataset consists out of two waves, at wave one all individuals where working and at wave two almost all the individuals were retired. Therefore, this dataset is very suitable to analyse the mechanism of the transition between the working life and retirement and map the effect of retirement on the health of these individuals (Van Solinge, 2005). The descriptive statistics show some remarkable results. The medical consumption of individuals decreases from 56% of income to 52%, and the number of individuals under medical supervision decreases from 48 % to 32%. This would imply that retirement actually has a positive effect on health, however, in reality this is more complex than this number would suggest. Further analyses indicate that 25-35% of these individuals show an improvement of their health after retirement. However, they also identify a group of 10-20% of whom the health significantly deteriorates after retirement (Van Solinge, 2005). These results are however only based on correlations, the authors do not focus on causality.

3 Institutional Context

I have decided to only focus on the Dutch pension system, because I want to do policy recommendations for the Netherlands. The Dutch pension system is founded on three pillars, which combined determine an individual's pension benefit. These pillars have embedded mechanism in their design to cope with future fluctuations and challenges (OECD, 2017)

The first pillar is a state pension (AOW), this is an old age pension benefit system for all residents. This provided individuals with a basic income and is linked to the statutory minimum wage. Individuals living with a partner each receive 50% of the statutory minimum wage, and individuals that live alone receive 70% of the minimum statutory wage. All individuals that have lived or worked in The Netherlands while aged between 15 and 65 have to right to receive this benefit (OECD, 2017). This pillar is financed through a pay-as-you-go system. Thus, the costs of the AOW benefits are paid by the workforce through contributions. However, additional funding is also received from the government public fund, which is primarily funded through taxes. Consequently, all individuals in some way contribute to the AOW costs (OECD, 2017) The second pillar is for the individuals in the workforce. These private collective pensions schemes are arranged between the employees and their employers. These schemes are usually controlled by pensions funds and insurance companies. Under Dutch law, pension funds are legal entities and operate separately and independently from the employers. Thus, pension funds are not affected by the financial parameters of the companies (OECD, 2017). This pillar has a mandatory nature, while by Dutch law individuals are not required to become a member of a pension fund. However, if a company decides to provide a pension scheme to its employees, the government can make it mandatory for the entire sector. Therefore, more than 90 percent of the Dutch employees have a pension scheme with their employers (OECD, 2017) The mandatory nature ensures industry-wide pension funds with sufficient economies of scale, enabling cost efficient management of the schemes. The pensions schemes in the second pillar can be divided into defined benefit and defined contribution schemes. Defined-Benefit (DB) schemes entail that the benefit an individual receives is predetermined and that the contribution he has to pay can vary. Most of the risks in this system are carried by the pension funds. Defined-Contribution (DC) schemes are the opposite. The contributions through premiums are fixed, the outcome of the investment is not. Here most of the risks are carried by the employee. Traditionally most of the pension schemes in the Netherlands had a Defined-Benefit character. However, a major shift can be identified towards Defined-Contribution schemes (Goudswaard, 2014).

The third pillar can be identified as supplementary mechanism to build up additional income after retirement. This pillar is consisting of numerous individual pensions arrangements, these vary between annuity insurances and tax-efficient savings accounts. Individuals that are self-employed or works in sectors without collective pension schemes predominantly focus on this pillar for additional income after retirement (Goudswaard, 2014).

The first two pillars have been under debate last couple of years. Many have questioned the future of the current pension system in the Netherlands. the life expectancy is rapidly increasing in Europe and the Netherlands follows the same trend (OECD, 2017). Consequently, individuals enjoy a longer retirement period. This trend puts pressure on the sustainability of the first pillar and pensions schemes with a Defined-Benefit (DB) character in the second pillar. Pension liabilities increase with rising life expectancy and ageing has a potentially negative effect on interest rates and investment returns, making it difficult for pension funds to live up to pension promises (OECD, 2017). Some measures are already taken to relieve some pressure on the system. The statutory retirement age will increase from 65.75 year in 2017 to 67 in 2021. Furthermore, the statutory retirement age will be linked with the life expectancy rate from 2021 onwards. According to current life expectancy projections the retirement age will reach 71 in 2067 in the Netherlands, being then the second highest statutory retirement age in the OECD after Denmark (OECD, 2017).

4. Theoretical Framework

As mentioned in the literature study numerous authors have attempted to map the factors that affect the physical and mental health. Grossman (1972) argues that health is a sustainable capital good that produces 'healthy time' as output. Individuals are born with an x amount of health stock, which increasingly depreciates with age and appreciates by investing in health. Once the health stock of an individual depletes it results into death. Furthermore, he distinguishes two aspects in the decision-making mechanism of individuals investing in health. On the one hand, individuals have a 'consumption motive', this entails that individuals experience utility in simply feeling health. On the other hand, individuals have an 'investment motive', this entails that a good health enables individuals participate in market and non-market activities (Grossman, 1972). Halliday et al (2009) find that the investment motive is almost 3 times bigger than the consumption motive during the twenties of individuals. However, the investment motive attenuates as the year pass by, and completely depletes after retirement (Halliday et al, 2009). Consequently, the health stock declines because individuals no longer invest in their health from the investment motive. Another aspect that fuels this process is the ever-increasing marginal utility of health after retirement, this entails that individuals increasingly prefer leisure instead of labour which depreciates the health stock (Halliday et al., 2009). Dave et al (2008) provide concrete evidence that there is indeed a negative causal relationship between retirement and health. They use numerous health indicators both for physical and mental health and find for all indicator a negative effect of retirement. (Dave et al., 2008).

Furthermore, various other variables are identified that seem to have an effect on the mental and physical health of individuals. These variables will be included the analysis as 'control variables. The Grossman model implies that age has a negative effect on the health stock and therefore on the health of an individual (Grossman, 1972). Furthermore, this model implies that wages have a positive effect on the health stock and through that on the overall health of individuals. Higher wages mean that the marginal product of a x amount of labour increases and this means that an individual has a higher income to invest in health (Grossman, 1972). However, van Solinge (2005) finds no correlation between income and health of individuals after retirement. This is remarkable from Grossman's paradigm. The being said, van Solinge (2005) uses a small dataset of 800 individuals and here primary focus is on descriptive

statistics, this jeopardizes the validity and reliability of her results. Higher wages mean that the marginal product of a x amount of labour increases and this means that an individual has a higher income to invest in health (Grossman, 1972).

The Grossman model also implies that the education level of individuals has a positive effect on the health stock. This effect is twofold; on the one hand, higher educated individuals have a healthier lifestyle, and this translates into a higher health stock. On the other hand, education level has a positive effect on the productivity of individuals in market and non-market activities and this results in a higher marginal product of health and this means a higher health stock (Grossman, 1972).

Dave et al. (2008) find that the effects of retirement manifest differently per gender. Retirement seems to particularly deteriorate the physical health of men and women seem to particularly suffer in the mental health sphere (Dave et al., 2008).

Finally, Dave et al. (2008) provide concrete evidence that the health deterioration of individuals that live alone is considerable higher in comparison of those that life with a partner. For instance, individuals that life alone show a mobility decline of around 7.3% after retirement for individuals that live with a partner this decline is only 2.6%. The mental health decline for individuals living alone is 12.8% for individuals living with a partner this decline is only 6.2% (Dave et al., 2008).

5. Methodology

Many scholars in the sphere of Social Sciences attempt to map the causal relationship of various indicators. Here, controlled randomized experiments are considered as the most preferable approach (Rosenbaum 2017). A straightforward approach then would be to conduct an experiment and, in that way, only capture exogenous variation of the independent variable. However, in the field of Social Sciences various limitations pop to the surface when attempting such methods, and therefore, many scholars deviate from this method and rely on observational data (Rosenbaum 2017). This applies for this study as well. Here, panel data has proved to be very suitable in identifying causal relationship between indicators. This method allows scholars to exploit variation within indicators over time to omit unobserved time invariant heterogeneity (Rosenbaum 2017). Furthermore, there seem to be an assumption that panel data identifies the causal path of variables (Vaisey & Miles, 2017). However, they seem to overlook one major using, namely the occurrence of reversed causality. The causal path of X and Y might run in both directions and even only in the other direction. Then, identifying causal path of X and Y becomes very complex even when working with panel data (Vaisey & Miles, 2017).

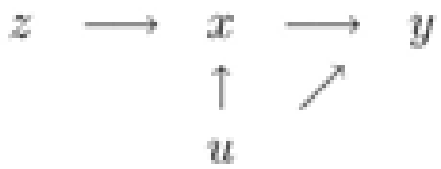
A remedy for reversed causality can be found by focusing on the exogenous variation in the independent variable X. A simple OLS regression model would be illustrated as follows: $Y = a + bX + u$ (Garson, 2018). Y is the value of de dependent variable, which is being predicted, a is a constant. They value of Y when x=0. b indicates the slope of the regression line; illustrating how much Y changes for each one-unit change in X, and u is the error term; the error in predicting the value of Y, given the value of X. Simple OLS regressions make the assumption that the regressors in a regression model are not correlated with the error term. Thus, the only effect of the independent variable Y would be a direct effect through bX. This is illustrated by the following figure, indicating that there is no association between u and x:

However, there is the possibility that the regressors is correlated with the error term. In the cases of retirement and health, it is possible that individuals retire earlier based on specific gains linked with early retired. For instance; individuals that very demanding jobs might retire earlier to relieve alleviate the mental and physical strain or individuals that enjoy their job very much might retire later. In such scenarios it would imply that the independent variable x and error term u are correlated, which is illustrated by the below diagram (Toshkov, 2016);

This implies that a change in the independent variable has two effects on the dependent variable y. On the one hand, there is a direct effect through x, and on the other hand there is an indirect via the error term u affecting x. this violates the OLS assumption that that the regressors in a regression model are not correlated with the error term. Thus, providing inconsistent model estimates (Toshkov, 2016)

The misspecification of the OLS model is here due to the endogeneity of the independent variable. A straightforward approach then would be to conduct an experiment and, in that way, only capture exogenous variation of the independent variable. However, due to practical limitation associated with this study this method is not feasible in this case (Toshkov, 2016)

I have chosen to apply the instrumental variable method to isolate only exogenous variation in my independent variable 'retirement'. For this method it is necessary that an instrument z exists, which has an effect on the independent variable but no direct effect on the dependent variable Y. The instrument may only have an indirect effect on Y through X. this is illustrated by the following path diagram:



Here, the variable *z* has association with the independent variable (x), but there is no association with the error term (u). However, there is still the possibility that *z* is correlated with the dependent variable (y), but only through the indirect path through x. Thus, it is ruled out that *z* is a regressor in the model for the dependent variable (y). Thus, *z* is uncorrelated with the error term and therefore exogenous. This is also one of the conditions for a suitable instrumental variable (*z*). Furthermore, for a suitable instrument it is required that it is relevant, indicating that it affects the independent variable X (Toshkov, 2016).

The Instrumental variable method works in two steps. In the first stage the instrumental variable Z, which is uncorrelated with the error term u is used to estimate the value of the original independent variable X. thus, isolating only exogenous variation in the independent variable X. You obtain purely random variation in the independent variable, by going through the first stage estimation. Then, in the second stage this exogenous variation is used to predict a linear regression model for the dependant variable Y (Angist & Pischke, 2014). This estimation is based on only exogenous variation in the independent variable. Consequently, the results of this model are optimal, since the values are only based on variables that are uncorrelated with the errors. After, the first stage one can conduct a F test to check whether the instrument is strong enough. instruments need to be strongly correlated with the variable instrumented to have reliable 2SLS estimators (Angist & Pischke, 2014)

As discussed previously in this study I attempt to identify the causal effect of retirement on both physical and mental health. This could be performed by a simple OLS model: $Y = a + bX + u$ (Garson, 2018). Y is the value of a specific health indicator, which is being predicted, a is a constant, hey value of Y when x=0 (individual is not retired). b indicates the slope of the regression line; illustrating how much the value of a health indicator changes for when an individual decides to retire, and u is the error term; the error in predicting the value of Y, given the value of X. However, I am concerned that the regressors are correlated with the

error term, it is possible that individuals retire earlier based on specific gains linked with early retired. For instance; individuals that very demanding jobs might retire earlier to relieve alleviate the mental and physical strain or individuals that enjoy their job very much might retire later. First, I will use the panel data to exploit variation within indicator over time to omit unobserved time invariant heterogeneity (Rosenbaum, 2017). The fixed effects methods will be applied here. This approach controls for time invariant unobserved heterogeneity, because this is fully captured by the unit specific error term (Brüderl & Ludwig, 2015) However, am concerned for the occurrence of reversed causality in this case. Poor health could have an effect on an individual's decision to retire (Coe & Zamarro, 2011). Therefore, I will also apply an instrumental variable approach to control for the possibility of reversed causality. The different statutory retirement ages in these countries will be used as an instrumental variable to estimate the causal effect of retirement on both physical and mental health. This variable has a direct effect on an individual's decision to retire since. This effect is twofold; on the one hand the statutory retirement can be identified as a norm in society in which it is acceptable to retire. On the other hand, individuals are eligible for certain retirement benefits once they reach this age (Coe & Zamarro, 2011). Furthermore, the statutory retirement age has no direct effect on an individua's health, since individual health indicators are not included in policymaking regarding eligibility rules here. The only effect that the statutory retirement can have on health is an indirect effect through the independent variable X (decision of retiring).

Therefore, I assume that using the variation in statutory retirement within each is a valid instrument for retirement. This instrumental variable has both a time and country effect. On the one hand, exogenous variation in statutory retirement ages within each country is be exploited, and on the other hand the time effect since a period of 14 years will be examined. Using both the fixed effects- and instrumental variable method allows to identify to what extend the OLS results are conditioned by unobserved heterogeneity at the individual level and to what extent by reverse causality. The IV method only uses the exogenous variation in the independent variable to estimates the parameters of the independent variable. Therefore, it is not necessary to control for time invariant unobserved heterogeneity (Angist & Pischke, 2014).

Regression models assume homoscedasticity; the residual of regression models is the same across all estimated values of the dependent variables. If this assumption is violated it entails that the regression model estimate inconsistent parameter for the dependent variable. This model misspecification can be solved by using robust standard errors to control for heteroscedasticity (Angist & Pischke, 2014). In this study I have used robust standard error in all the estimations. I have used clustered robust standard errors using the household identifier as a cluster. This allows me to also control for the fact that various respondents are member of the same household. Furthermore, to control for omitted variable bias on the country level all countries are included as dummies in the regression specifications. This allows me to control for countries effects. Thus, compare outcomes across countries.

6. Data

For this thesis the Survey of Health, Ageing and Retirement in Europe is used. This is a very rich cross-national dataset on an individual level. It consists of numerous indicators for socioeconomic and social status of individuals. Furthermore, a very extensive number of indicators for the physical and mental health of individuals is provided. I use the data from waves 1 until 7 excluding wave 3. Wave 3 is excluded because most of the indicators in this study were not included in wave 3. These waves provide information for a period of 14 years, starting in 2004 in wave 1 until the year 2017 in wave 7. This allows me to construct a panel dataset (Börsch-Supan,2019). Individuals of more than 20 countries were included, however some countries participated only in 1 wave or the time period between their participation was long. Since this study requires time variation in the instrument, only countries that have participated in at least two waves are included. The new dataset contains information on individuals aged 50+ from the following countries: Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Israel, Croatia, Czech Republic, Poland, Estonia, Slovenia, Portugal, Luxembourg and Hungary. The data from the remaining countries have been excluded in this study. The majority of the indicators that were operationalized previously are readily available in this dataset. However, certain modifications were conducted to set up the dataset. First of all, the SHARE dataset consists of several modules per waves. Only modules that contained relevant information for this study are included. These modules are first merged per wave, then the variable waves are computed. Subsequently, these datasets are appended into one dataset. Furthermore, only observations have been used that had a valid outcome, all other outcomes have been omitted. Since, the focus of this study is individuals aged 50+ and the effect of the decision to retire and short-term effects of retirement, only individuals aged between 50+ have been included in the study. Finally, the dataset was extended with the statutory retirement ages per country and per wave. This instrumental variable has two effects. On the one hand, exogenous variation in statutory retirement ages within each country is exploited, and on the other hand the time effect since a period of 14 years is examined and variation over this time period is exploited.

Furthermore, this study is performed with a strong emphasizes to warrant for the validity of the results. First of all, both for physical and mental health various multiple indicators are used to map the independent at variables. Using multiple indicators allows to capture the effect of a variable more extensively. Thus, warrant for valid outcomes (Bryman, 2012). Also, in the theoretical framework other variables are identified that can have an effect on the

physical and mental health of individuals. These variables will be included as control variables in this thesis. This method will help to control for omitted variable bias in the estimates of the regression analysis, which in turn will warrant for the internal validity of the study (Bryman, 2012). Furthermore, the external validity of the study is warranted as well, because the used dataset forms a valid representation of the target population of this study. Approximately 55% of the respondents is women and 45% are men. The average age of the respondent is 65 years. Furthermore, the Netherlands is appropriately represented in the dataset, accounting for 4 percent of the total.

The reliability of the study is warranted by large dataset which is used. The dataset contains more than 240000 observations and 88000 respondents. An increase in the sample size reduces the standard error. Thus, increasing the chance of identifying statistically significant relationships between variables (Miles & Shevlin, 2000).

7. Operationalisation

As independent variable in this study I have chosen 'retirement'. This variable is made measurable by analysing when an individual fully withdraws from the labour market and indicates to be retired.

Furthermore, two dependent variables have been identified, namely the mental health and physical health of individuals. The physical health has been made measurable by various indicators. First of all, number of limitations with activities of daily living will be used to identify the mobility problems of individuals. This indicator examines the number of limitations an individual has in activities in the following five tasks: dressing themselves, taking a shower/bath, cutting food, walking through the room and coming out of bed. The value of this variable varies from 1 to 5. The higher the numbers, the more difficulties an individual has with these activities (Börsch-Supan,2019). Furthermore, the indicator mobility is used to identify arm function and fine motor limitations of individuals. The score varies between 0 to 10, in which 0 entails no limitations and 10 that an individual suffers from the maximum 10 limitations (Börsch-Supan,2019). These indicators map the objective health. To get a better picture of physical health, also an indicator has been included that map the subjective health of individuals. Here self-perceived health has been added. The score varies between 1 to 5, in which 1 entails excellent health and 5 means a very poor health (Börsch-Supan,2019).

To map the mental health of individuals, the CASP-12 score is used as an indicator. This index measures the quality of life of individuals based on 4 indicators: control, autonomy, leisure and self-realisation. The index is the sum of these four indicators. The score can vary between 12 and 48, the higher this number the higher the quality of life of individuals (Börsch-Supan,2019).

Furthermore, the EURO-D depression scale is included to map the mental health of individuals. The score can vary between 0 and 12, in which score 0 indicates no depression and score 12 indicates very depressed (Börsch-Supan,2019).

Also, in the theoretical framework other variables are identified that can have an effect on the physical and mental health of individuals. These variables will be included as control

variables in this thesis. The literature indicates that the health stock of individuals depreciates with age, and that due to this the overall health of individuals deteriorates as they become older (Grossman, 1972). Therefore, I will include the age in years as a control variable in this study. Another variable that that seems to have an effect on the mental and physical health of individuals is the income of individuals. The Grossman model claims that the level of wages of individuals have a positive effect on the health stock (Grossman, 1972). To make this indicator measurable I have focused on easily a household is able to make ends meet. The score of this variable can vary between 1 and 4, in which 1 indicates that an household has major difficulties to make ends meet and 4 indicates that an household can easily make ends meet (Börsch-Supan,2019). To capture this indicator even more, the net worth of households is also included as a control variable (Börsch-Supan,2019). Furthermore, the Grossman model indicates that the level of education of individuals has a positive effect on the health of individuals. Therefore, I will include the education level of individuals as a control variable in this study. I will use the ISCED classification of education, in which score 0 indicates that an individual has enjoyed no education and score 6 indicates university level education (Börsch-Supan,2019). The literature also suggests that the effects of retirement on health differ per gender (Dave et al., 2008). Therefore, the gender of individuals has been included in this study. Furthermore, Dave et al. (2008) found that the health deterioration after retirement was smaller for individuals that lived together with a partner in comparison to those we lived alone. To control fort his indicator the variable 'couple' will be included in this study. This dummy variable has score 1 for individuals that live with a partner and score 0 for individuals that live alone (Börsch-Supan,2019). To capture this indicator even more extensively, I will also include the number of grandchildren of individuals as a control variable. Furthermore, the Grossman model implies that the lifestyle of individuals can have an effect on the health stock and therefore on the overall health (Grossman, 1972). To control fort his I will include two variables; whether an individual smoke at present and whether an individual has ever smoked daily. To map the drinking behaviour, I will include whether an individual drinks more than two glasses of alcohol on a daily basis.

8. Descriptive Statistics

This study can be considered as extensive with a sample size of 310986 observations and 126969 respondents. Furthermore, it is identified that approximately 56 percent of the individuals is female and 44 percent male. The average age of the respondents is approximately 67 years. Men respondents are on average almost 11 days older than female respondents. Furthermore, more than 12000 observations are identified from the Netherlands, which constitutes to 4% of the total. More than 95% of the respondents have enjoyed some form of education on the ISCED classification scale. Furthermore, more than 72 percent of the respondents live with a partner. Individuals from Germany have on average the highest education level of a 3.5 on the ISCED classification scale. This score entails that post-secondary non-tertiary education. Respondents from Spain have the lowest education level of a 1.5 on the ISCED classification scale. This score entails lower secondary education level. furthermore, it is identified that men are on average slightly higher educated in comparison to women. Also, individuals that are higher educated seems to have less difficulties to make ends meet. Additionally, the net worth of a household seems to increase when the level of education of the household members increases.

As argued previously in this study the statutory retirement ages are used as an instrumental variable to isolate the exogenous variation in the independent variable 'retirement'. This instrumental variable has both a time and country effect. On the one hand variation within countries is exploited to isolate the exogenous variation in the independent variable. And on the other hand, the variation over time will be exploited, since a period of 14 years is analysed. Table 1 presents the average statutory retirement ages per year in the dataset.

Year	Average Statutory Retirement Age
2004	61.77
2009	61.55
2011	62.90
2013	63.48
2015	63.74
2017	63.64

Table 1 Statutory Retirement ages per year

Here, some variation over time can be identified. Over a period of 14 years and increase of almost 2 years in the average statutory retirement is experienced. At a first glance this could indicate that this variable indeed exploits variation over time. However, for this instrument to be valid, variation overtime within countries is required. The following table illustrates the average statutory retirement ages for each country per year.

	2004	2009	2011	2013	2015	2017
Belgium	60	60	65	.	65	65
Croatia	.	.	.	.	62.9	63.2
Czech Republic	59.6	60.3	61	.	63	62.3
Denmark	65	65	65	65	65	65
Estonia	.	.	61.9	62.5	62.8	63.3
France	59	59	62.3	64.1	64.9	66
Greece	57	57	.	.	67	67
Germany	65	65	65	65.2	65.3	65.5
Israel	.	.	.	64.2	64.4	65.1
Italy	59	59	62.3	64.1	64.9	66
Luxembourg	.	.	.	65	65	65
Netherlands	65	65	65	65	.	.
Poland	.	60	60	.	60.5	60
Portugal	.	.	65	.	66	66.3
Slovenia	.	.	58.3	58.7	59.3	59.7
Spain	65	65	65	65.1	65.3	65.4
Sweden	61	61	61	61	61	61
Switzerland	63.9	63.9	64.5	64.5	64.5	64.5

Table 2 Average Statutory retirement age per country

Here, in the vast majority of the countries the statutory retirement changes over time. This supports the rational that there is variation in the statutory retirement ages within countries

over time. Consequently, this random variation can be used to isolate exogenous variation in the independent variable. Thus, the statutory retirement ages are a valid instrument to isolate exogenous variation in the independent variable. However, it would be premature to conclude the latter on merely descriptive statistics.

9. Results

In this section the effects of retirement on both the physical and mental will be analysed. The variable physical health is operationalised in three different indicators. Both subjective and objective indicators are included. Thus, this variable is captured extensively.

To determine whether the instrument 'statutory retirement age' is relevant enough. Two-Staged least squares regressions are conducted for al physical and mental health indicators separately with only retirement as the explanatory variable and 'statutory retirement age' as instrument. Here, the first stage analysis identifies that the instrument has a high correlation with the endogenous regressor retirement. Furthermore, the test in which the null hypothesis is that the effect of retirement is equal to zero, yields F-values vary between 500 and 550. An F-value above ten indicates that the instrument is relevant enough. Thus, the statutory retirement age can be identified as a valid instrument in this study.

First of all, ADL, number of limitations with activities of daily living is included to identify the mobility problems of individuals. This indicator examines the number of limitations an individual has in activities in the following five tasks: dressing themselves, taking a shower/bath, cutting food, walking through the room and coming out of bed. Furthermore, the indicator mobility is used to identify the arm function and fine motor limitations of individuals. These indicators map the objective physical health of individuals. To get a better picture of physical health, also an indicator has been included that maps the subjective health of individuals. Here self-perceived health has been added.

To map the mental health of individuals, the CASP-12 score is used as an indicator. This index measures the quality of life of individuals based on 4 indicators: control, autonomy, leisure and self-realisation. The index is the sum of these four indicators. Furthermore, the

EURO-D depression scale is included to map the mental health of individuals. This allows to capture the mental health of individuals more extensively.

Physical Health

In table 3 the results for de the dependent variable the number of limitations with activities of daily living is illustrated. This variable identifies the mobility problems of individuals. This variable examines the number of limitations an individual has in activities in the following five tasks: dressing themselves, taking a shower/bath, cutting food, walking through the room and coming out of bed. The value variates from 1 to 5. The higher the numbers, the more difficulties an individual has with these activities. According to the OLS model retirement seems to have a small negative statistically significant effect on number of limitations individuals experience with activities of daily living (B= -0,155 and p=0,000). This entails that individuals experience less limitations with activities of daily living after retirement. However, this merely indicates association no causality. Thus, the number of limitations with activities of daily could have an effect on the decision of an individual to retire. Next, the fixed effects model is applied to control for time invariant unobserved heterogeneity. Here, the effect of retirement decreases, however it remains statistically significant and in the same direction (B= -0.0606 and p=0,000). In presence of reversed causality this model is biased, since the assumption of exogeneity is violated. Therefore, instrumental variable regression is performed. Here, the exogenous variation in the independent variable is used to estimate the parameters of the independent variable. This method allows to identify the causal path of the variables and control for reversed causality. This model identifies a strong negative effect of retirement on the number of limitations with activities of daily living (B= -1,244 and p=0,102). This would entail that individuals experience approximately 25% less limitations with activities of daily living after retirement. This effect is the combined effect of an individual's decision to retire and short-term effect after retirement. However, the p value of 0.102 indicates a probability of more than 10% that this effect is identified due to sampling error. Thus, this effect could merely be caused by chance alone and therefore cannot be used to make any conclusions. Furthermore, the vast majority of the control variables have an effect in the expected direction and these effects are statistically significant. Individuals that have smoked daily in the past, experience more limitations with activities of daily living. The age of individuals as an effect in the same direction. Furthermore, the education of individuals

seems to alleviate the number of limitations with activities of daily living. The same applies for those with higher household income and net worth.

Table 3 difficulties with activities of daily living

	(1) OLS	(2) OLS	(3) FE	(4) IV
retired		-0.155***	-0.0606***	-1.244
		(0.00869)	(0.0115)	(0.761)
female	0.0118***	0.0176***		-0.0945
	(0.00585)	(0.00577)		(0.0823)
ever smoked daily	0.00943	0.0153**	0.0107	0.0560**
	(0.00689)	(0.00686)	(0.0102)	(0.0275)
smoke at present	-0.00256	-0.00281	-0.0386***	-0.00230
	(0.00611)	(0.00610)	(0.0147)	(0.00760)
age	0.0153***	0.0201***	0.0209***	0.0528**
	(0.000435)	(0.000582)	(0.00119)	(0.0234)
education	-0.0282***	-0.0274***	0.00321	-0.0218***
	(0.00214)	(0.00213)	(0.0174)	(0.00436)
household income	-0.0797***	-0.0788***	-0.0168***	-0.0661***
	(0.00155)	(0.00154)	(0.00559)	(0.00633)
living with a partner	-0.0758***	-0.0692***	-0.0800***	-0.0217
	(0.00659)	(0.00656)	(0.0204)	(0.0322)
household net worth	0.000118***	0.000171***	7.47e-06	0.000379**
	(0.000471)	(0.000471)	(0.000824)	(0.000171)
number of grandchildren	0.00283**	0.00303**	-0.0130***	0.00327*
	(0.00144)	(0.00143)	(0.00383)	(0.00177)
Constant	-0.466***	-0.679***	-1.003***	-2.155**
	(0.0334)	(0.0384)	(0.0879)	(1.048)
Observations	86,159	86,159	86,159	86,159
R-squared	0.074	0.080	0.017	0.410
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In table 4 the results for the dependent variable mobility is illustrated. This indicator identifies the number of arm function and fine motor limitations of individuals. The score varies between 0 to 10, in which 0 entails no limitations and 10 that an individual suffers from the maximum of 10 limitations. According to the OLS model retirement seems to have a

moderate negative statistically significant effect on the number of arm and fine motor limitations individuals experience (B= -0,348 and p=0,000). This constitutes to a 3,5% decrease in the number of arm function and fine motor limitations after retirement. However, the direction of this effect is not known. Thus, the number of arm function and fine motor limitations could have an effect on the decision of an individual to retire. Next, the fixed effects model is applied to control for time invariant unobserved heterogeneity. Here, the effect of retirement decreases, however it remains statistically significant and in the same direction (B= -0,210 and p=0,000). In presence of reversed causality this model is biased, since the assumption of exogeneity is violated. Here again, an instrumental variable regression is conducted to identify the causal path of the variables, the exogenous variation in the independent variable is used to estimate the parameters of the independent variable. Here, the effect increases significantly, and a very high p value can be identified (B= -2,471 and p=0,202). Thus, suggesting that individuals would experience almost 25% les arm function and fine motor limitations. However, the p value of 0,202 indicates a probability of more than 22% that this effect is identified due to sampling error. Thus, this effect could merely be caused by chance alone and therefore cannot be used to make any conclusions. The majority of the control variables have an effect in the expected direction and these effects are statistically significant. As individuals become older, they experience more arm function and fine motor limitations. Furthermore, higher educated individuals seem to experience less arm function and fine motor limitations. Furthermore, the level of household income and net worth seem to mitigate the number of limitations. Female individuals seem to experience more arm function and fine motor limitations in comparison to male individuals ceteris paribus.

Table 4 number of pens function and five matter limitations

	(1) OLS	(2) OLS	(3) IE	(4) IV
retired		-0.348***	-0.210***	-2.471
		(0.0206)	(0.0276)	(1.935)
female	0.592***	0.560***		0.949*
	(0.0167)	(0.0167)		(0.230)
ever smoked daily	0.0408**	0.0539***	0.0349	0.137**
	(0.0181)	(0.0180)	(0.0240)	(0.0699)
smoke at present	-0.0146	-0.0151	-0.140***	-0.00391
	(0.0185)	(0.0185)	(0.0942)	(0.0209)
age	0.0661***	0.0768***	0.0802***	0.141**
	(0.00102)	(0.00128)	(0.00281)	(0.0594)
education	-0.180***	-0.158***	0.0684	-0.144***
	(0.00610)	(0.00609)	(0.0483)	(0.0112)
household income	-0.421***	-0.419***	-0.0895***	-0.391***
	(0.00931)	(0.00931)	(0.0130)	(0.0159)
living with a partner	-0.161***	-0.146***	-0.142***	-0.0570
	(0.0185)	(0.0185)	(0.0453)	(0.0819)
household net worth	-0.00106***	-0.00113***	0.000292	-0.00151***
	(0.000168)	(0.000169)	(0.000237)	(0.000450)
number of grandchildren	0.0185***	0.0189***	-0.0342***	0.0181***
	(0.00136)	(0.00135)	(0.00861)	(0.00430)
Constant	-1.231***	-1.759***	-3.378***	-4.621*
	(0.0874)	(0.0950)	(0.224)	(2.662)

Observations	86,159	86,159	86,159	86,159
R-squared	0.207	0.210	0.040	0.076
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses

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

In table 5 the results for the dependant variable 'self-perceived health' is illustrated. This is a subjective health indicator. The score varies between 1 to 5, in which 1 entails excellent health and 5 means a very poor health. According to the OLS model retirement seems to have an extremely small negative effect on the self-perceived health of individuals (B= 0,0009 and p=0,923). However, this effect is not statistically significant, the p vale of 0.923 indicates a very high probability that this effect is identified by chance. Once, we control for time invariant unobserved heterogeneity the effect increases considerably and becomes statistically significant (B= 0,0647 and p=0,000). However, in presence of reversed causality this model is biased, since the assumption of exogeneity is violated. Here again, an instrumental variable regression is conducted to identify the causal path of the variables, the exogenous variation in the independent variable is used to estimate the parameters of the independent variable. Now, the effect increases strongly and remains statistically significant (B=-0.2423 and p=0.000). This would entail that individuals experience an improvement of almost 5% in their self-perceived health after retirement. Individuals that smoked in the past experience a deterioration in their self-perceived health. As individuals become older, they experience an increasing deteriorating in their self-perceived health. Furthermore, higher educated individuals seem to enjoy a better self-perceived health. The same applies for individuals with higher household income and net worth.

Table 5 Self Perceived Health

	(1) OLS	(2) OLS	(3) FE	(4) IV
retired		-0.000894	-0.0675***	-0.2423***
		(0.00921)	(0.0140)	(0.1242)
female	0.0256***	0.0255***		-0.228*
	(0.00820)	(0.00826)		(0.134)
ever smoked daily	0.0287***	0.0287***	-0.000634	0.114**
	(0.00840)	(0.00840)	(0.0114)	(0.0448)
smoke at present	0.0464***	0.0464***	-0.0600***	0.0480***
	(0.00937)	(0.00937)	(0.0172)	(0.0134)
age	0.0236***	0.0236***	0.0377***	0.0970**
	(0.000447)	(0.000520)	(0.00138)	(0.0381)
education	-0.0989***	-0.0989***	0.00511	-0.0880***
	(0.00302)	(0.00302)	(0.0279)	(0.00712)
household income	-0.207***	-0.207***	-0.0452***	-0.192***
	(0.00429)	(0.00429)	(0.00633)	(0.00984)
living with a partner	-0.0338***	-0.0338***	-0.00913	0.0640
	(0.00868)	(0.00870)	(0.0226)	(0.0525)
household net worth	0.000898***	0.000898***	0.000120	-0.00135***
	(0.000105)	(0.000105)	(0.000128)	(0.000298)
number of grandchildren	-0.00129	-0.00129	-0.00953**	0.00323
	(0.00141)	(0.00141)	(0.00398)	(0.00252)
Constant	2.376***	2.375***	0.819***	-0.903
	(0.0395)	(0.0413)	(0.120)	(1.709)
Observations	86,159	86,159	86,159	86,159
R-squared	0.207	0.207	0.033	0.409
Controlled for country	yes	yes	no	yes

effects

Robust standard errors in parentheses

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

Mental Health

To map the mental health of individuals, the CASP-12 score is used as an indicator. This index measures the quality of life of individuals based on 4 indicators: control, autonomy, leisure and self-realisation. The index is the sum of these four indicators. The score can vary between 12 and 48, the higher this number the higher the quality of life of individuals. In table 6 the results for this variable is indicated. According to the OLS model individuals experience a small improvement in their quality of life after retirement (B= 0,800 and p=0,000). Next, the fixed effects model is applied to control for time invariant unobserved heterogeneity. Here, the effects decrease slightly but remains in the same direction (B= 0,711 and p=0,000). Once, controlled for reversed causality the effect increases very strongly (B= 11, 68 and p=0.100). The combined effect of decision to retire and the short-term effect after retirement is an increase of almost 12 points on the CASP-12 index. This would entail that retirement has a considerable positive causal effect on the quality of life of individuals. However, the combination of a p value of 0.100 and a robust stand error of more than 7 points obelizes the reliability of this outcome.

Table 6 CASP-12 quality of life index

	(1) OLS	(2) OLS	(3) FE	(4) IV
retired		0.800***	0.598***	11.68*
		(0.0535)	(0.0841)	(7.095)
female	-0.229***	-0.159***		0.947
	(0.0448)	(0.0449)		(0.742)
ever smoked daily	-0.0845*	-0.113**	-0.109	-0.451*
	(0.0472)	(0.0471)	(0.0662)	(0.246)
smoke at present	-0.430***	-0.428***	0.333***	-0.417***
	(0.0513)	(0.0513)	(0.104)	(0.0690)
age	-0.0876***	-0.112***	-0.0417***	-0.451**
	(0.00260)	(0.00316)	(0.00845)	(0.222)
education	0.313***	0.309***	0.135	0.268***
	(0.0165)	(0.0165)	(0.144)	(0.0353)
household income	2.392***	2.388***	1.056***	2.304***
	(0.0251)	(0.0250)	(0.0988)	(0.0954)
living with a partner	0.541***	0.508***	-0.00155	0.101
	(0.0497)	(0.0496)	(0.140)	(0.289)
household net worth	0.00457***	0.00473***	0.000754	0.00655***
	(0.000517)	(0.000519)	(0.000681)	(0.00158)
number of grandchildren	0.0401***	0.0389***	0.0768***	0.0245*
	(0.00811)	(0.00809)	(0.0241)	(0.0133)
Constant	36.54***	37.67***	36.14***	52.96***
	(0.226)	(0.241)	(0.686)	(10.01)
Observations	85,299	85,299	85,299	85,299
R-squared	0.906	0.908	0.032	0.4154
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses

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

Furthermore, the EURO-D depression scale is included to map the mental health of individuals. This is presented in table 7. According to the OLS model individuals are slightly less depressed after retirement (B= -0,271 and p=0,000). However, the direction of this effect cannot be identified. Next, the fixed effects model is applied to control for time invariant unobserved heterogeneity. Here, the size of the effect decreases slightly but remains in the same direction (B= -0,203 and p=0,000). However, in presence of reversed causality this

model is biased, since the assumption of exogeneity is violated. Here again, an instrumental variable regression is conducted to identify the causal path of the variables. the exogenous variation in the independent variable is used to estimate the parameters of the independent variable. Here, the directions stay the same, but the size of the effect increases considerably (B= -1.791 and p=0.000). The combined effect of the decision to retire and the short-term effect after retirement is a decrease of almost 2 points on the EURO-D depression scale. Thus, retirement has a considerable positive effect on the mental health of individuals on basis of the EURO-d scale. Furthermore, it can be identified that smoking daily in the past has negative effect on the mental health of individuals. The household income and net worth seem to have positive effect on the mental health of individuals from the EURO-d perspective.

Table 7 EURO-D depression scale

	(1)	(2)	(3)	(4)
Euro-d	OLS	OLS	FE	IV
retired		-0.271***	-0.203***	-1.791***
		(0.0204)	(0.0327)	(0.6709)
female	0.712***	0.687***		-1.200*
	(0.0170)	(0.0170)		(0.725)
ever smoked daily	0.139***	0.149***	0.0652**	0.771***
	(0.0182)	(0.0182)	(0.0280)	(0.243)
smoke at present	0.0920***	0.0916***	-0.0670*	0.0778
	(0.0194)	(0.0193)	(0.0402)	(0.0680)
age	0.0172***	0.0255***	0.0185***	0.566***
	(0.000966)	(0.00118)	(0.00116)	(0.306)
education	-0.104***	-0.102***	0.00400	-0.0140
	(0.00615)	(0.00614)	(0.0547)	(0.0384)
household income	-0.487***	-0.485***	-0.154***	-0.366***
	(0.00935)	(0.00933)	(0.0151)	(0.0519)
Living with partner	-0.282***	-0.270***	-0.429***	0.455
	(0.0188)	(0.0188)	(0.0583)	(0.284)
Household net worth	0.000517***	0.000534***	-5.65e-05	-0.00421***
	(0.000146)	(0.000147)	(0.000231)	(0.00154)
Number of grandchildren	0.00426	0.00461	-0.0174*	0.0225
	(0.00312)	(0.00311)	(0.00955)	(0.0137)
Constant	2.356***	1.984***	2.033***	-22.27**
	(0.0837)	(0.0893)	(0.257)	(9.343)
Observations	93,120	93,120	93,120	86,159
R-squared	0.137	0.139	0.009	0.413
Controlled for country	yes	yes	no	yes

effects

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Extension

I have decided to extent the initial scope of the study. Since, one of my goals was to do policy recommendation for the Netherlands. the previous analysis is performed again but only for a selected number of countries. I have chosen to include the following countries; Germany, Sweden, Denmark, Switzerland, Belgium and the Netherlands. these countries have an extensive pension system and can be identified as welfare state systems with generous welfare arrangements (Esping-Andersen, 1990). Furthermore, from an economical perspective these countries are very comparable. Their economies can be identified as robust and they belong to ten strongest economies in Europe (IMF, 2018). Thus, these countries are very comparable and can provide valid outcomes which I can use to do policy recommendations for the Netherlands.

In table 8 the results for de the dependent variable the number of limitations with activities of daily living is illustrated. This variable identifies the mobility problems of individuals. This variable examines the number of limitations an individual has in activities in the following five tasks: dressing themselves, taking a shower/bath, cutting food, walking through the room and coming out of bed. The value variates from 1 to 5. The higher the numbers, the more difficulties an individual has with these activities. The models identify a negative effect of retirement on the number of limitations with activities of daily living. When controlled for reversed causality a strong and statistically significant effect can be identified (B-1,147 and p=0.000). thus, the combined effect of the decision to retire and short-term effect after retirement induces 23% decreases in the number of limitations with activities of daily living. Thus, indicating that individuals will experience a significant improvement in their physical health (from this indicator). furthermore, it can be identified that smoking at present or in the past and age have results in an increase in the number of limitations. On the other hand, the

education level of individuals and their household income and net worth results in a decrease in the number of limitations.

Table 8: difficulties with activities of daily living

	(1) OLS	(2) OLS	(3) FE	(4) IV
retired		-0.0767***	-0.0444***	-1.147***
		(0.0103)	(0.0129)	(0.374)
female	0.0210***	0.0146**		0.484***
	(0.00737)	(0.00732)		(0.0397)
ever smoked daily	0.00837	0.00879	0.0271**	0.115***
	(0.00798)	(0.00797)	(0.0114)	(0.0241)
smoke at present	0.0117	0.0120	-0.0498***	0.125***
	(0.00822)	(0.00822)	(0.0182)	(0.0270)
age	0.0111***	0.0136***	0.0178***	0.0435***
	(0.000587)	(0.000752)	(0.00139)	(0.0123)
education	-0.0340***	-0.0234***	0.0271	-0.0722***
	(0.00278)	(0.00278)	(0.0236)	(0.00911)
household income	-0.0725***	-0.0728***	-0.0174**	-0.471***
	(0.00492)	(0.00492)	(0.00690)	(0.0138)
living with a partner	-0.0684***	-0.0664***	-0.0426**	-0.231***
	(0.00831)	(0.00831)	(0.0213)	(0.0280)
household net worth	0.000203***	0.000232***	-0.000108*	-0.00101***
	(3.79e-05)	(3.83e-05)	(6.00e-05)	(0.000227)
number of grandchildren	-0.00434***	-0.00421**	-0.0117***	-0.00191
	(0.00165)	(0.00165)	(0.00372)	(0.00425)
Constant	-0.211***	-0.334***	-0.956***	1.372**
	(0.0417)	(0.0491)	(0.114)	(0.606)
Observations	45,562	45,562	45,562	45,562
R-squared	0.051	0.052	0.017	0.063
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses

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

In table 9 the results for the dependent variable mobility is illustrated. This indicator identifies the number of arm function and fine motor limitations of individuals. The score varies between 0 to 10, in which 0 entails no limitations and 10 that an individual suffers from the maximum of 10 limitations. The models identify a negative and statistically significant effect

of retirement on the number of arm function and fine motor limitations. Controlling for time invariant unobserved heterogeneity induces a small increase in this effect. However, when also controlled for reversed causality the effect increases considerably (B= -0.958 and p=0.000), this entails that individuals experiences almost 10% less arm function and fine motor limitations after retirement. Also, the education level of individuals and their household income and net worth induce a decrease in the number of limitations. However, smoking daily in the past and age seem to increase the number of limitations.

Table 8 number of arm function and fine motor limitations

	(1) OLS	(2) OLS	(3) RE	(4) IV
retired		-0.170***	-0.185***	-0.958***
		(0.0287)	(0.0330)	(0.370)
female	0.492***	0.478***		0.411***
	(0.0226)	(0.0227)		(0.0397)
ever smoked daily	0.0995*	0.0408*	0.0280	0.0472**
	(0.0231)	(0.0230)	(0.0270)	(0.0235)
smoke at present	0.105***	0.105***	-0.0649	0.108***
	(0.0257)	(0.0257)	(0.0443)	(0.0261)
age	0.0507***	0.0563***	0.0697***	0.0821***
	(0.00143)	(0.00184)	(0.00357)	(0.0122)
education	-0.129***	-0.127***	0.0595	-0.121***
	(0.00854)	(0.00853)	(0.0579)	(0.00903)
household income	-0.407***	-0.407***	-0.0629***	-0.411***
	(0.0135)	(0.0135)	(0.0162)	(0.0137)
living with a partner	-0.157***	-0.152***	-0.0492	-0.131***
	(0.0253)	(0.0253)	(0.0521)	(0.0276)
household net worth	-0.00176***	-0.00182***	9.57e-05	-0.00213***
	(0.000160)	(0.000162)	(0.000233)	(0.000222)
number of grandchildren	-0.00437	-0.00410	-0.0347***	-0.00285
	(0.00453)	(0.00453)	(0.0100)	(0.00463)
Constant	-0.499***	-0.775***	-3.086***	-2.035***
	(0.113)	(0.128)	(0.290)	(0.603)
Observations	45,562	45,562	45,562	45,562
R-squared	0.151	0.152	0.033	0.131
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses

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

In table 10 the results for the dependant variable 'self-perceived health' is illustrated. The OLS model indicates that retirement induces a small deterioration in the self-perceived health of individuals (B=0.0406 and p=0.000). However, when controlled for time invariant unobserved heterogeneity the effect changes in direction (B= -0.0735 and p=0.000). Thus, suggesting that in fact retirement induces an improvement in the self-perceived health of individuals. When also controlled for reversed causality the effect increases significantly in size and remain in the same direction (B=-2.919 and p=0.000). Thus, retirement induces a 40% improvement in the self-perceived health of individuals. This can be identified as the combined effect of the decision to retire and short-term effects after retirement.

Table 10 self-perceived health

	(1) OLS	(2) OLS	(3) FE	(4) IV
retired		0.0406***	-0.0735***	-2.919***
		(0.0142)	(0.0183)	(0.253)
female	-0.00951	-0.00605		-0.182***
	(0.0125)	(0.0126)		(0.0267)
ever smoked daily	0.0233*	0.0230*	0.0162	0.0395**
	(0.0124)	(0.0124)	(0.0147)	(0.0160)
smoke at present	0.102***	0.102***	-0.0729***	0.110***
	(0.0143)	(0.0143)	(0.0233)	(0.0176)
age	0.0202***	0.0189***	0.0401***	0.0863***
	(0.000673)	(0.000814)	(0.00189)	(0.00836)
education	-0.0912***	-0.0915***	-0.0127	-0.0744***
	(0.00453)	(0.00453)	(0.0389)	(0.00605)
household income	-0.246***	-0.246***	-0.0335***	-0.253***
	(0.00666)	(0.00666)	(0.00889)	(0.00837)
living with a partner	-0.0202	-0.0213	0.00346	0.0337*
	(0.0134)	(0.0135)	(0.0296)	(0.0184)
household net worth	-0.00131***	-0.00129***	1.97e-05	-0.00209***
	(0.000121)	(0.000121)	(0.000151)	(0.000187)
number of grandchildren	-0.00824***	-0.00830***	-0.00619	-0.00504*
	(0.00215)	(0.00215)	(0.00584)	(0.00284)
Constant	2.658***	2.723***	0.446**	-0.579
	(0.0563)	(0.0601)	(0.175)	(0.415)
Observations	45,562	45,562	45,562	45,562
R-squared	0.118	0.118	0.036	0.437
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses

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

The findings for the CASP-12 is presented in table 11. Here, the OLS model identifies a small increase in the quality of life of individuals after retirement (B=0.616 and p=0.000). This effect decreases slightly when controlled for time invariant unobserved heterogeneity. However, after controlling for reversed causality the direction of this effect changes and it increases significantly in size (B=-6.438 and p=0.000). This entails that individuals score almost 6.5 points less the quality of life index. Thus, suggesting a significant deterioration of mental health after retirement form the quality of life perspective. Furthermore, it is identified that the education level, household income and net worth have a positive effect on the quality of life of individuals.

Table 11 CASP-12 quality of life index

	(1) OLS	(2) OLS	(3) FE	(4) IV
retired		0.616***	0.564***	-6.438***
		(0.0775)	(0.0991)	(1.127)
female	0.0713	0.123*		-0.469***
	(0.0633)	(0.0635)		(0.120)
ever smoked daily	-0.0505	-0.0553	-0.198**	9.13e-05
	(0.0644)	(0.0642)	(0.0774)	(0.0738)
smoke at present	-0.490***	-0.491***	0.247*	-0.478***
	(0.0741)	(0.0740)	(0.133)	(0.0825)
age	-0.0553***	-0.0758***	-0.0116	-0.158***
	(0.00580)	(0.00472)	(0.0102)	(0.0376)
education	0.206***	0.202***	0.306	0.254***
	(0.0237)	(0.0236)	(0.208)	(0.0274)
household income	2.445***	2.448***	0.803***	2.410***
	(0.0379)	(0.0378)	(0.0498)	(0.0421)
living with a partner	0.473***	0.460***	-0.189	0.653***
	(0.0715)	(0.0715)	(0.163)	(0.0850)
household net worth	0.00540***	0.00564***	0.000545	0.00299***
	(0.000492)	(0.000497)	(0.000603)	(0.000672)
number of grandchildren	0.0497***	0.0490***	0.113***	0.0569***
	(0.0138)	(0.0138)	(0.0304)	(0.0135)
Constant	33.91***	34.91***	36.05***	23.44***
	(0.309)	(0.339)	(0.947)	(1.860)
Observations	42,094	42,094	42,094	42,094
R-squared	0.186	0.188	0.024	0.437
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses

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

Next, the findings for the EURO-D depression scale is presented in table 12. The models identify that retirement alleviates depression. The OLS model identifies a small negative effect of retirement on the EURO-D depression scale and when controlled for time invariant unobserved heterogeneity the effect remains almost unchanged (use other word). After controlling for reversed causality, the effect remains in the same direction, but increases strongly (B=-1.147 and P=0.000). This entails that individuals score more than one point lower on the EURO-D depression scale after retirement. Thus, suggesting that retirement induces a considerable improvement in the mental health of individuals. Furthermore, it is identified that smoking and age induce a deterioration on the depression scale. Also, females seem to score higher on the depression scale in comparison to men. Individuals that life with a partner experience less depression.

Table 12 EURO-D depression scale

	(1) OLS	(2) OLS	(3) FE	(4) IV
retired		-0.171***	-0.175***	-1.147***
		(0.0274)	(0.0384)	(0.374)
female	0.592***	0.577***		0.494***
	(0.0290)	(0.0281)		(0.0397)
ever smoked daily	0.106***	0.107***	0.0703**	0.115***
	(0.0236)	(0.0235)	(0.0313)	(0.0241)
smoke at present	0.121***	0.121***	-0.0455	0.125***
	(0.0266)	(0.0266)	(0.0493)	(0.0270)
age	0.00601***	0.0116***	0.0219***	0.0435***
	(0.00131)	(0.00162)	(0.00384)	(0.0123)
education	-0.0817***	-0.0803***	-0.0508	-0.0722***
	(0.00850)	(0.00850)	(0.0758)	(0.00911)
household income	-0.466***	-0.467***	-0.115***	-0.471***
	(0.0135)	(0.0135)	(0.0194)	(0.0138)
living with a partner	-0.262***	-0.257***	-0.394***	-0.231***
	(0.0256)	(0.0256)	(0.0670)	(0.0280)
household net worth	0.000565***	0.000630***	-0.000232	0.00031***
	(0.000169)	(0.000169)	(0.000230)	(0.000227)
number of grandchildren	-0.00372	-0.00345	-0.0195*	-0.00191
	(0.00409)	(0.00409)	(0.0117)	(0.00425)
Constant	3.211***	2.937***	1.521***	1.572**
	(0.109)	(0.119)	(0.346)	(0.606)
Observations	45,562	45,562	45,562	45,562
R-squared	0.094	0.095	0.009	0.063
Controlled for country effects	yes	yes	no	yes

Robust standard errors in parentheses

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

10. Conclusion

This study situated around the following question: *'What is the effect of retirement on the physical and mental health of individuals aged 50+ '*. Here the economic "Health Investment' model of Grossman (1972) functioned as the theoretical backbone Grossman (1972) argues that health is a sustainable capital good that produces "healthy time" as output. Individuals are born with an x amount of health stock, which increasingly depreciates with age and appreciates by investing in health. Once the health stock of an individual depletes it results into death. Furthermore, he distinguishes two aspects in the decision-making mechanism of individuals investing in health. On the one hand, individuals have a 'consumption motive', this entails that individuals experience utility in simply feeling health. On the other hand, individuals have an 'investment motive', this entails that a good health enables individuals participate in market and non-market activities (Grossman, 1972). the investment motive attenuates as the year pass by, and completely depletes after retirement (Halliday et al, 2009). Consequently, the health stock declines because individuals no longer invest in their health from the investment motive. Another aspect that fuels this process is the ever-increasing marginal utility of health after retirement, this entails that individuals increasingly prefer leisure instead of labour which depreciates the health stock (Halliday et al., 2009). Thus, this model argues that the overall health of individuals deteriorates after retirement. In this study mixed evidence has been identified.

Focusing on the physical health indicators certain findings were identified. First of all, individuals experience approximately 25% less limitations with activities of daily living after retirement. However, the p value of 0.102 indicates a probability of more than 10% that this effect is identified due to sampling error. Thus, this effect could merely be caused by chance alone and therefore cannot be used to make any conclusions Furthermore, the analysis indicates that individuals experience almost 25% less arm function and fine motor limitations after retirement. However, this effect has a very high p value of 0.202. Also, the analysis indicates that individuals experience an improvement of almost 5% in their self-perceived health after retirement. This effect is statistically significant with a P-value of 0.000.

Furthermore, findings were reported for mental health indicators the combined effect of the decision to retire and the short-term effect after retirement is an increase of almost 12 points on the CASP-12 index. This entails that retirement has a considerable positive causal effect on the quality of life of individuals. However, the combination of a p value of 0.100 and a robust stand error of more than 7 points obelizes (use other word) the reliability of this outcome. For the EURO-D depression scale a decrease of almost 2 points can be identified. This effect is statistically significant with a p value of 0. 000. Thus, indicating that retirement has a considerable positive effect on the mental health of individuals on basis of the EURO-d scale.

These findings make the answering of the research question rather complex. In case of physical of health, only one of the three indicators have a statistically significant effect. Based on this indicator, experience individuals an improvement of almost 5% in their self-perceived health after retirement. Therefore, once could argue that retirement has a positive effect on the physical health of individuals. This is the combined effect of individuals decision to retire and short-term effect after retirement. However, I think it would be premature to conclude this on basis of only one indicator. For mental health only the EURO-D depression scale identifies a statistically significant effect and shows a decrease of almost two points. Thus, indicating that retirement has a positive effect on the mental health of individuals.

However, the specifications of the extension of this study provide more consistent results for the physical health indicators. For physical health all the indicators identify a health improvement after retirement and are statistically significant. Individuals experience 23% less limitations with activities of daily living, experience almost 10% less arm function and fine motor limitations and an 40% improvement in their self-perceived health. For mental health the findings are mixed. On the hand, individuals score almost 6.5 points less in quality of life index. Thus, suggesting a significant deterioration of mental health after retirement. However, this indicator has a very high robust stand error of above 1. The findings of the EURO-D depression indicate a decrease of more than one point. Thus, suggesting that retirement induces a considerable improvement in the mental health of individuals.

In the theocratical framework various variables were identified that seem to have an effect on the mental and physical health of individuals. These variables were included in the regression models, and their findings is discussed in the analysis chapter. Here, the implication of these

findings for the theory will be discussed. One of the core assumptions of the Grossman model is that the health stock depreciates with age. In this study strong evidence has been identified for this assumption. All the regressions models indicate that the age of individuals has a negative effect on both the physical and mental health. Furthermore, the Grossman model assumes that income has a positive effect on the health stock and therefore on the overall health of individuals. The findings of the study strongly support this assumption. It is identified that household income and net worth of households has a positive effect on both physical and mental health indicators. Another core assumption of this model is that the education level of individuals has a positive effect on the health stock. The Grossman model also implies that the education level of individuals has a positive effect on the health stock. This effect is twofold; on the one hand, higher educated individuals have a healthier lifestyle, and this translates into a higher health stock. On the other hand, education level has a positive effect on the productivity of individuals in market and non-market activities and this results in a higher marginal product of health and this means a higher health stock. The evidence for this assumption is overwhelming in this study. All regression models indicate an effect in the expected direction and are statistically significant. Furthermore, living with a partner seems to have a positive effect on the overall health of individuals. Smoking has a negative effect on the overall health.

I am are concerned that retirement might have different effects on health for different individuals. For example, retirement from a job that requires strenuous physical labor might affect one's health differently than retiring from a desk job. Due to data limitations, we cannot control for many characteristics of the job an individual retires from, and thus we have limited ability to identify the underlying distribution of health effects. While the individual effects are important for individual decisions, my methodology only identifies the average effect of retirement on health, which should be of interest to policymakers setting early and full retirement ages.

Furthermore, in various regression models the OLS and fixed-effects and instrumental variable regressions indicate conflicting effects. Here, the results of the instrumental variable model have been considered has final. However, no explanations have been identified for these conflicting results.

11. Recommendations for future research

This study only captured a limited part of mental health. The SHARE dataset contained only a limited number of mental health indicators. The two indicators used in this study map the subjective mental health of individuals, because the surveys were completed by the respondents without medical specialist supervision. It would be very interesting to use more objective mental health indicators and analyse what effect retirement has on such indicators.

In this study 19 European countries and Israel were analysed. I did this to guarantee a large small size and capture a time and country effect. On the one hand variation between countries was exploited to isolate the exogenous variation in the independent variable. And on the other hand, the variation over time was exploited, since a period of 14 years is analysed. However, only 12000 observations were identified from the Netherlands, which constitutes to 4% of the total. For future research it can be very interesting to only focus on the Netherlands and a few countries that have comparable welfare state systems. Results from such a study would perhaps more suitable to do policy recommendations in the Dutch case.

Grossman (1972) distinguishes two aspects in the decision-making mechanism of individuals investing in health. On the one hand, individuals have a 'consumption motive', this entails that individuals experience utility in simply feeling health. On the other hand, individuals have an 'investment motive', this entails that a good health enables individuals participate in market and non-market activities. The investment motive attenuates as the year pass by, and completely depletes after retirement. Consequently, the health stock declines because individuals no longer invest in their health from the investment motive. Another aspect that fuels this process is the ever-increasing marginal utility of health after retirement, this entails that individuals increasingly prefer leisure instead of labour which depreciates the health stock. Thus, the overall health of individuals deteriorates after retirement. However, this study identifies mixed findings on this. Therefore, it highly advisable to test this theory again with a different dataset and a more extensive set of indicators.

12. Policy Recommendations

The first two pillars have been under debate last couple of years. Many have questioned the future of the current pension system in the Netherlands. the life expectancy is rapidly increasing in Europe and the Netherlands follows the same trend (OECD, 2017). Consequently, individuals enjoy a longer retirement period. This trend puts pressure on the sustainability of the first pillar and pensions schemes with a Defined-Benefit (DB) character in the second pillar. Pension liabilities increase with rising life expectancy and ageing has a potentially negative effect on interest rates and investment returns, making it difficult for pension funds to live up to pension promises (OECD, 2017). Another issue here is the rising collective health costs in the Netherlands. The current growth of this costs is higher than our economic growth, and therefore voices have surfaced questioning the sustainability of this system Some measures are already taken to relieve some pressure on the system. The statutory retirement age will increase from 65.75 year in 2017 to 67 in 2021. Furthermore, the statutory retirement age will be linked with the life expectancy rate from 2021 onwards. According to current life expectancy projections the retirement age will reach 71 in 2067 in the Netherlands, being then the second highest statutory retirement age in the OECD after Denmark (OECD, 2017). The rationale behind these policies is that it would solve both problems. On the one hand, it would increase the income of pension funds and decrease their costs. On the other hand, government would generate more income to finance the rising health costs. The core assumption of this policy is that retirement does have no negative effect on the health of individuals after retirement. In this study the combined effect of the decision to retire and short-term effect after retirement on the mental and physical health were identified.

My main goal was to use the results of this study to do policy recommendations for the current retirement and collective health costs issues in the Netherlands. Here, I will focus on the findings of the specifications with only Belgium, Germany, Denmark, Netherlands, Sweden and Switzerland. For physical health all the indicators identify a health improvement after retirement and are statistically significant. Individuals experience 23% less limitations with activities of daily living, experience almost 10% less arm function and fine motor limitations and an 40% improvement in their self-perceived health. For mental health the findings are mixed. On the hand, individuals score almost 6.5 points less in quality of life index. Thus, suggesting a significant deterioration of mental health after retirement. However,

this indicator has a very high robust stand error of above 1. The findings of the EURO-D depression indicate a decrease of more than one point. Thus, suggesting that retirement induces a considerable improvement in the mental health of individuals.

Focusing on only physical health these findings strongly support the current government core assumption that retirement does not have a negative effect on the health of individuals. This study has identified the combined effect of the decision to retire and short-term effects after retirement. And can be very useful for policymakers. However, the mental health indicators used in this study identify contradictory effects. Additional research is necessary in this sphere. A study with an extensive set of mental health indicators could possibly identify more suitable effects.

13. Bibliography:

Angrist, J. and J.-S. Pischke. 2014. Mastering 'Metrics: The Path from Cause to Effect. Princeton University Press

Boschman, O. (2017). Vermogen pensioenfondsen gestegen naar 181% van bbp in 2016. [illegible]

Börsch-Supan, A. (2019). Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 1,2,4,5,6 & 7. Release version: 7.0.0. SHARE-ERIC. Data set.

Brüderl, Josef and Volker Ludwig. 2015 "Fixed-Effects Panel Regression". Pp. 327-358 in Regression Analysis and Causal Inference, edited by H. Best and C. Wolf. London: Sage.

Coe N, Lindeboom M.. CentER Discussion paper 2008-93. 2008. Does Retirement Kill You? Evidence from Early Retirement Windows.

Dave, D., Rashad, R. I., & Spasojevic, J. (2008). The Effects of Retirement on Physical and Mental Health Outcomes. Southern Economic Journal, 75(2), 497-523.

Esping-Andersen, Gosta (1990). The Three Worlds of Welfare Capitalism. Princeton: Princeton University Press.

Goudswaard, K. P. (2014). Blijft het Nederlandse pensioenstelsel bijzonder? Den Haag: Koninklijke Vereniging voor de Staathuishoudkunde.

Grossman, M. (1972). On the Concept of Health Capital and the Demand for Health. Journal of Political Economy, 80(2), 223-255.

Gruber, Jonathan. Wise, DA. Social Security Programs and Retirement around the World: Microestimation
University of Chicago Press; Chicago: 2004.

Halliday, T. J., Hui, H., & Zhang, H. (2009). Health Investment over the Life-Cycle. Accessed on: 27 march 2019, van: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1496504

Miles, J. & Shevlin, M. (2000). Applying Regression and Correlation: a guide for students and researchers. London, Verenigd Koninkrijk: SAGE Publications.

Minkler M. Research on the health effects of retirement: an uncertain legacy. Journal of Health and Social Behavior.

OECD (2017), " Pensions at a Glance 2017 " , https://www.oecd.org/newsroom/PAG2017-NLD.pdf.

Rijksoverheid. (2012). Naar beter bestuur zorg. Rapport Taskforce Beheersing Zorguitgaven.

Rosenbaum, Paul R. 2017. Observation and Experiment: An Introduction to Causal Inference. Cambridge, MA: Harvard University Press.

Sahlgren, G. H. (2012). Work longer, life healthier: The relationship between economic activity, health and government policy. Accessed from: http://iea.org.uk/wp-content/uploads/2016/07/Work%20Longer%20Live%20Healthier.pdf

Toshkov, D. (2016). Research Design in Political Science. Basingstoke: Palgrave Macmillan.

Van Solinge, H. (2005). Veranderingen in gezondheid in de overgang van werk naar pensioen: een longitudinale analyse. Accessed from: https://www.nidi.nl/shared/content/output/2005/go-18-06-vansolinge.pdf

Vaisey, Stephen and Andrew Miles. 2017. "What You Can—and Can't—Do With Three-Wave Panel Data." Sociological Methods and Research 46(1) 44–67.

Master Thesis, Mojib Saree, S1408801

GRADEMARK RAPPORT

EINDCIJFER

/0

ALGEMENE OPMERKINGEN

Docent

PAGINA 1

PAGINA 2

PAGINA 3

PAGINA 4

PAGINA 5

PAGINA 6

PAGINA 7

PAGINA 8

PAGINA 9

PAGINA 10

PAGINA 11

PAGINA 12

PAGINA 13

PAGINA 14

PAGINA 15

PAGINA 16

PAGINA 17

PAGINA 18

PAGINA 19

PAGINA 20

PAGINA 21

PAGINA 22

PAGINA 23

PAGINA 24

PAGINA 25

PAGINA 26

PAGINA 27

PAGINA 28

PAGINA 29

PAGINA 30

PAGINA 31

PAGINA 32

PAGINA 33

PAGINA 34

PAGINA 35

PAGINA 36

PAGINA 37

PAGINA 38

PAGINA 39

PAGINA 40

PAGINA 41

PAGINA 42

PAGINA 43

PAGINA 44

PAGINA 45

PAGINA 46

PAGINA 47

PAGINA 48

PAGINA 49

PAGINA 50

PAGINA 51