Self-employed in the Dutch pension system: are reforms needed?

An analysis of the influence of risk aversion and financial literacy on pension savings

Dilara Keserlioğlu – s1562401
Leiden University, Faculty of Governance and Global Affairs
MSc Public Administration: Economics and Governance
Thesis supervisor: Eduard Suari Andreu
Second reader: Jim Been
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Universiteit
Leiden
The Netherlands

Table of Contents

I. Introduction

In the last decade the number of self-employed has increased rapidly in The Netherlands. The total amount of self-employed has increased from 8,1 percent of all workers in 2003 to 12,2 percent in 2018 (CBS, 2019). According to the statistics of CBS (2019) there are currently approximately 1,1 million self-employed in The Netherlands. This means that the self-employed form a substantial part of the working population. The increase in self-employment has raised concerns about social protection of the self-employed. There is discussion amongst Dutch political parties about whether or not a minimum wage rate of 16 euros per hour should be introduced for self-employed to protect them against poverty (Trouw, 2019). Furthermore, there are worries about the social protection of self-employed in terms of disability insurance and pension savings. Employees save for their pension and are insured for disability via their employer but self-employed need to make their own arrangements. Research by Nibud (2018) shows that one third of all retirees struggle to make ends meet, and for retirees who used to be self-employed this number is even higher at 44 percent. This thesis focusses on the latter issue: the pension savings of self-employed.

The Dutch pension system is arranged in a way that self-employed are individually responsible to make good financial decisions for their post-retirement income. While employees can save in collective pension funds through their employer, the self-employed need to decide about investments and savings for their post-retirement income on their own. Different studies (Zwinkels et al, 2017; SER, 2010; Hatfield, 2015) show that self-employed save less for their retirement than employees. Mastrogiacomo, and Alessie (2015) quantified the retirement saving problem for self-employed. They concluded that retirement savings of self-employed are low and also lower than how much the individuals intended to save. However, their study was not aimed at explaining what factors contribute to the gap in pension savings between self-employed and employees. It is of importance for society that retirees have enough financial resources and that their income does not drop too dramatically in the transition from work to retirement. If the government wants to create policy to limit the gap between self-employed and employees, it is necessary to understand where the difference comes from. I aim to contribute to this understanding with my thesis.

Self-employment does not happen randomly. People decide, based on different factors, that they want to become self-employed. Because this self-selection happens, the self-employed are likely to differ in certain aspects from employees. The expectation is that the self-employed are less risk averse and more financially literate than employees. This is an important difference

because risk aversion and financial literacy also influence retirement savings (Delsen & Kantarci, 2014; Van Rooij et al, 2011). Because risk aversion and financial literacy are expected to be related to both self-employment and saving behavior, these factors need to be examined to understand the post-retirement savings of the self-employed. The research question that will be answered in this thesis is: *what is the effect of risk aversion and financial literacy on the savings for retirement of self-employed?*

The answer to this research question contributes to the existing literature by providing more insight into the factors that explain the saving behavior of self-employed. In this thesis, I provide an answer to why self-employed save less for retirement than employees and what role risk aversion and financial literacy play in saving behavior. Not only does this study contribute to the academic debate, it also has practical implications. Policy options, such as creating an opt-out saving system for self-employed, an obligatory system, or keeping the system as it is, can be better evaluated if there is more knowledge about the influence of certain characteristics on saving behavior.

In this research, panel data from the DNB Household Survey is used. In this survey, questions about the economic and psychological aspects of financial behavior are asked. I use the data to create the variables for self-employment, risk aversion, financial literacy and third pillar savings. The statistical method that I use is OLS with robust standard errors. I find that there is no significant difference between self-employed and employees in their amount of third pillar pension savings. I do find significant effects for risk aversion and financial literacy. The relationship between risk aversion and third pillar savings is negative and the effect of financial literacy and third pillar savings is positive.

This thesis is divided into several sections. First, the Dutch pension system is briefly explained in the institutional context. Afterwards in the literature review, the research on determinants for self-employment, the saving problem for self-employed, and the relationship between risk aversion and financial literacy on one hand and saving behavior on the other is examined. Furthermore, the statistical analysis is explained in the research methodology chapter. In this thesis the Dutch Household Survey (DHS) data is used to answer the research question. The summary statistics and description are given. Thereafter the results of the regression analysis are provided and explained. This is followed by a conclusion, a discussion of the limitations, suggestions for further research, and policy implications.

II. Institutional context

II.I The pension system in the Netherlands

The Dutch pension system consists of three pillars. The first pillar incorporates the state-financed benefits that every retired person gets, this is called AOW. This basic pension is financed through a pay-as-you-go scheme. For each year that someone lives in The Netherlands between the age of 15 and 65 two percent of the AOW is build up (Rijksoverheid, 2019a). Received benefits do not depend on premiums payed. This means that also retirees who never participated in the working force will receive AOW.

The second pillar consists of a collective pension to which the employer and employee contribute. This is financed on a capital basis. Almost all employees, around 90 percent, save through a pension fund (Rijksoverheid, 2019b). The second pillar is not accessible for self-employed, but there are some exceptions, such as a fund for temporary workers, and the mandatory fund for painters. All other self-employed are unable to build up a pension in the second pillar as long as they do not also work as an employee. The exclusion from the second pillar is the root cause for the differences in savings between employees and self-employed. It is the central problem in this thesis.

The third pillar includes all individual insurances that are aimed at providing a post-retirement income, such as life annuity or life insurance. The payout for retirement depends on the annual premiums payed and the investment rates. This method to determine the payout is similar to how the payout in the second pillar is established. The main difference between the second and the third pillar is that in the second risks are shared collectively and the employer contributes to the pension, and in the third they are borne by the individual.

Besides these three official pillars there are two recognized unofficial ways to save for retirement. The first consist of private savings and housing wealth (Nibud, 2019). The second is working after retirement age to generate income (Nibud, 2019). These could be considered as the fourth and fifth pillar. In practice the Dutch barely use housing wealth to finance their retirement (Suari Andreu, 2018). The focus in this thesis will therefore be mostly on the third pillar.

II.II Reforming the pension system

After nine years of discussion between social partners in The Netherlands an agreement about pension reforms has been reached in June 2019 (Rijksoverheid, 2019c). Some of these reforms have an effect on the self-employed. The first change is that self-employed will become obliged

to insure themselves against the incapacity to work (Koolmees, 2019). Until this agreement, insurance was voluntary. The second is that the government will analyze how self-employed can participate in the pension funds of their sector in the second pillar (Koolmees, 2019). The second pillar used to be only available for those who work or had worked for an employer and asked for a voluntary continuation. The government wants to make the second pillar available to everyone, including all self-employed to stimulate them and to make it easier to save more for retirement. The third change is that the current pension system in which accrual is fixed independent of age will be replaced by a system with age dependent accrual (Koolmees, 2019). This direct link makes it more attractive for self-employed to take part in the pension system through the second pillar (Koolmees, 2019). The changes will come into effect after the legal framework is finalized in 2022 (Koolmees, 2019).

It will be interesting to see if self-employed will voluntarily join pension funds in the second pillar and if the measures will lead to a higher percentage of self-employed with an adequate post-retirement income. Whether or not reforms will work depends largely on the reasons why self-employed did not safe enough in the first place. With this thesis I would like to contribute to the knowledge about the characteristics of self-employed that influence saving behavior.

III. Literature review

III.I Characteristics of the self-employed in The Netherlands

The choice to become self-employed does not occur randomly. It is highly likely that there are certain characteristics, resources, and circumstances that influence the decision to become self-employed. In order to tackle this self-selection bias in this thesis, it is important to know which determinants influence the decision to become self-employed. Not only do these determinants explain why people choose self-employment, they probably also explain behavior in a broader sense, including saving behavior.

A first notable difference between self-employed and the rest of the working population is that men are more inclined than women to enter into self-employment (Koellinger et al., 2013; Verheul et al., 2012). The Netherlands is no exception to this finding: the division between men and women working as employees is approximately 50-50 while it is 60-40 for self-employed (CBS, 2018).

Workers who are older are more willing to become self-employed. The enthusiasm to become self-employed peaks at a certain age after which it drops again (Simoes, Crespa &

Moreira, 2016). Parker (2009) concludes that the peak of the probability of transitioning into self-employment lays between the age of 35 and 44. Georgellis et al (2005) conclude that for British workers the peak occurs later at the age of 48, based on data from the British Household Panel Survey (BHPS). Figure 1 displays

Figure 1: Age of the Dutch working population

Source CBS (2019)
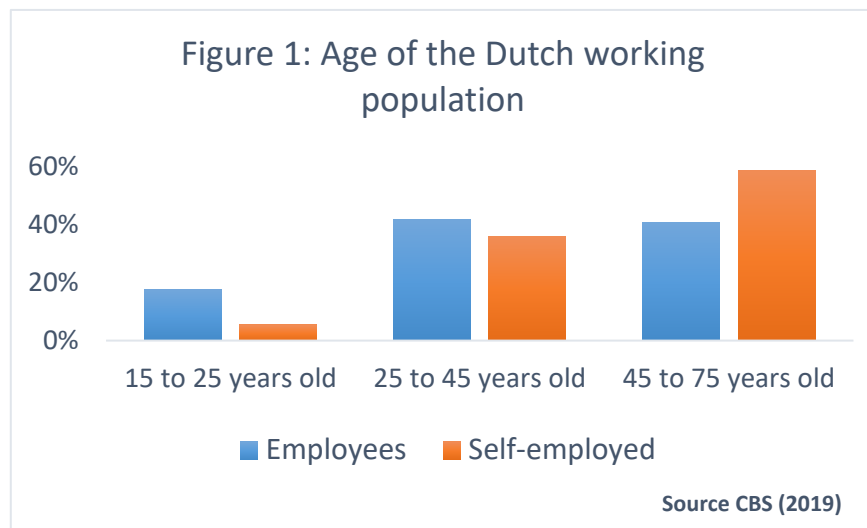
the differences in age between self-employed and employees in The Netherlands, based on data from CBS. From this graph, it is clear that self-employed are generally older, as the majority, 59 percent, is part of the oldest age group in comparison to 41 percent of the employees. However, this may be an age effect, but could also be a cohort effect.

Figure 2 displays the differences in level of education between self-employed and employees in The Netherlands. Most self-employed have a background in higher education, and this exceeds the number of employees with a background in higher education. However, the literature is ambiguous in its conclusions about the relationship between education and the likelihood to enter into self-employment. Some literature demonstrates that education has a positive impact on the likelihood of self-employment, while other literature shows a negative or insignificant effect (Simoes, Crespa & Moreira, 2016).

Figure 2: Level of education of the Dutch working population

Source CBS (2019)
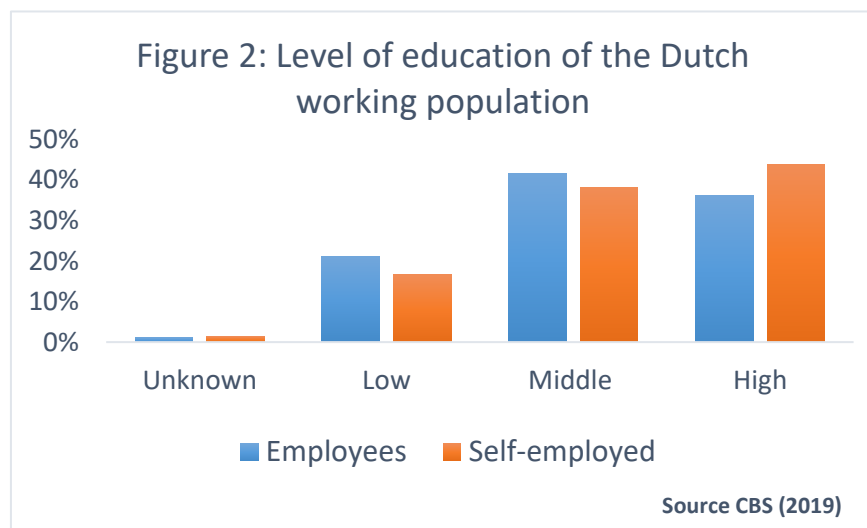
Wealth and access to financial resources logically seem to be important determinants for entry into self-employment because some entrepreneurial activities require a large initial investment. Different scholars (Evans & Jovanovic, 1989; Johansson, 2000) found a positive relationship between household wealth and becoming self-employed. Hurst and Lusardi (2004), however, claim that this relationship between wealth and self-employment is very weak. There are also questions about the causality of the relationship. Just because people who enter into

self-employment are wealthier, does not mean that people without wealth cannot enter. Li et al. (2016) tried to control for this problem by using the reform of the pension system which reduced pension wealth. They concluded that there is a strong negative effect between wealth reduction and the likelihood to enter into self-employment (Li et al., 2016). In conclusion, there is no complete consensus, but the majority of the scholars seems to identify a positive relationship between wealth and self-employment (Simoes, Crespa & Moreira, 2016). According to statistics of CBS (2018) in The Netherlands self-employed more often than employees own their own house (65 percent), and more often have household wealth of more than 100.000 euro (53 percent). However, it remains unclear in which direction the relationship between self-employment and wealth goes. It could be that higher wealth facilitates self-selection into self-employment, but it could also be that individuals start accumulating more wealth once they are self-employed.

Finally and most importantly for this thesis, risk aversion and financial literacy are related to the probability of becoming self-employed. For risk aversion Cramer et al. (2002) performed one of the first empirical tests to determine the relationship between self-employment and risk aversion. They conclude that there is a negative relationship between risk aversion and entrepreneurship. Douglas, Shephard and Dean (2002) and Ekelund et al (2005, p. 658) establish that people with a higher tolerance for risk are more willing to become self-employed. Furthermore, research has shown that tolerance for risk is partly determined by genetics (Dohmen et al., 2005). This means that it is likely that risk attitudes influence the decision to become self-employed and not the other way around.

Nykvist (2008) argues that financial sophistication makes an individual more willing to enter into self-employment. Ćumurović and Hyll (2019) use data from a German Household panel to research the relationship between financial literacy and self-employment. They use an IV approach in which information about the education of the mother is used as an instrument to determine causality. The education of the mother is likely to influence the respondents financial literacy, while the choice to become self-employed cannot influence the education of the mother. With this instrumental variable they find a positive effect of financial literacy on the probability of becoming self-employed.

III.II The pension saving problem of the self-employed

According to the Life Cycle Hypothesis by Modigliani and Brumberg (1954) people try to maximize their utility by maintaining the same marginal utility of consumption over time. This

model predicts that individuals will save during their working life and dissave during retirement. However, Berheim et al. (2001) and Battistin et al. (2009) find evidence that contradicts the Life Cycle Hypothesis. They find that some people do not save enough to maintain their consumption utility, even though the decrease in income at retirement age is predictable. This is called the retirement consumption puzzle and can be applied to the self-employed.

A first important study that shows that self-employed save too little in The Netherlands is of Mastrogiacomo and Alessie (2015). Similar to my study, they use the DHS dataset to research the possible ways in which self-employed save for their retirement. They conclude that third pillar savings (through annuities and life insurances) are low for everyone, also for self-employed. Self-employed do significantly own more fiscally facilitated pension savings, but the absolute difference with employees is very small (Mastrogiacomo & Alessie, 2015, p. 7). Mastrogiacomo and Alessie also research the willingness of self-employed to save. Self-employed attach more importance to saving for retirement than employees, but the self-employed are twice as likely to fail in trying to reach their saving target (Mastrogiacomo & Alessie, 2015, p. 8).

Mastrogiacomo and Alessie also research if and how much self-employed save in unconventional ways. These unconventional ways could be called the fourth pillar and consists of real estate investments and saving accounts (that do not fall under the first, second or third pillar). Mastrogiacomo and Alessie use confirmatory factor analysis to determine the motives for unconventional savings. Two-thirds of unconventional savings cannot be attributed to any motive, and only 2 % can be attributed to saving for pensions (Mastrogiacomo & Alessie, 2015, p. 20). They find no difference between self-employed and employees. In comparison to employees, self-employed only save a little more in the third pillar and nothing more in the fourth pillar. This means that self-employed save less than employees who can also save in the second pillar. In conclusion, self-employed save insufficiently for their retirement.

The insufficient pension savings of self-employed is confirmed by other research. Zwinkels et al. (2017) found that approximately 43 percent of self-employed in the Netherlands will not meet a replacement ratio of 70 percent, and the third pillar only plays a marginal role in retirement savings. Hatfield (2015) concluded that self-employed across Europe are less likely to have paid into private pensions and are at higher risk of financial instability than employees.

These scholars have contributed to the quantification of the pension saving problem for self-employed and they showed that there is a real difference in total pension savings between

employees and self-employed. The insufficient savings of self-employed could pose a real difficulty for Dutch society because there are more self-employed than ever. It is therefore necessary to not only identify the problem but also have a closer look at the causes of the problem. I aim to contribute to the literature by looking at the role of risk aversion and financial literacy in the saving problem of self-employed.

III.III Risk aversion and pension savings

Risk aversion influences financial decision making (Van Rooij et al., 2007). There are two ways in which risk aversion could influence saving behavior. Bajtelsmit and VanDerhei (1997) show that people who are more risk averse will be more conservative in their investments, which leads to a lower return and thus a lower replacement rate (Bajtelsmit and VanDerhei, 1997). This means that people who are less risk averse should be able to obtain a higher replacement rate on average. However, in practice the variability in replacement rates is quite large, which means that the relationship between risk aversion and investment returns is not very clear. Hence, I will look at the second effect of risk aversion on saving behavior.

Bommier, Chassagnon and Le Grand (2012) find that people who are more risk averse will increase their precautionary savings. Precautionary savings are based on the motive that there is uncertainty about future income. Increased uncertainty increases these savings. Pension savings could be seen as a form of precautionary savings. Based on this research I expect that risk aversion will have a negative relationship with pension savings.

Risk aversion influences both self-employment and pension savings. It is an omitted variable in the relationship between self-employment and saving. I expect that the self-employed will save less because they are less risk averse.

III.IV Financial literacy and pension savings

There is a strong positive relationship between how financially knowledgeable a person is and how much they will plan for retirement (Lusardi & Mitchell, 2010; Van Rooij et al., 2011). Van Rooij et al. (2011) use a customized module of the DHS dataset to show that the causality goes from financial literacy to planning by using financial education as an instrument for financial literacy. Because retirement is in the far future during the school period, the financial education received is not related to planning for retirement. They find that financial education is a strong predictor for financial literacy and financial literacy has a positive relationship with planning for retirement. Van Rooij et al (2011) and Lusardi and Mitchell (2010) find that the effect is the

strongest when there is advanced financial literacy. People who are very financially knowledgeable will plan well for retirement.

Kalwij et al. (2019) have added to this research field by conducting a controlled field experiment with children in Dutch primary schools. The children either did or did not receive a financial education program. The ones who did, scored higher on financial literacy and had a higher probability of willingness to save. However, the long-term effect on saving behavior is unknown because the post-test was only conducted a few weeks after the education program. Furthermore, it is unclear if the effect would be the same for adults.

The evidence of previous research shows that there is a relationship between financial literacy and savings. Financial literacy thus influences both self-employment and pension savings. It is an omitted variable in the relationship between self-employment and saving. I therefore expect that the self-employed will save more in the third pillar than employees because they are more financially literate.

IV. Research methodology

I run a regression analysis in three steps to see how being self-employed influences pension savings. In all steps the standard errors are clustered on the household level because some observations in the dataset are related to each other. For example, the observations of an individual are not independent from the other members of the household. Furthermore, because panel data is used, observations are also not independent over time. If these correlations are not taken into account, the standard errors will be incorrect. To solve this problem, the observations are clustered on the household level.

The first step is a basic regression analysis of the independent variable and the dependent variable. In the second step I add control variables to tackle the problem of omitted variable bias. Omitted variable bias means that the result of the regression analysis is biased because a variable that correlates with both the independent and the dependent variable is left out. Hence, all the variables that influence both self-employment and the amount of pension savings are included in the analysis to avoid omitted variable bias. Being older, being healthier, being male, being higher educated, and having a sufficient income are associated with higher savings (Hershey et al., 2010). Age, gender, education, and income are also related to the probability of becoming self-employed, as has been shown in the literature review. To take the effects of these variables on self-employment and pension savings into account, I control for age, health, gender, education and household income. Furthermore, I control for household structure and

therefore add number of children and partner in the household to the regression analysis. The estimation equation is:

$$P_{it} = \beta_0 + \beta_1 S_{it} + \beta_2 C_{it} + \varepsilon_{it}$$

where P is the dependent variable third pillar pension savings, β is the coefficient for each variable, and S represents the independent variable self-employment, in which $S=1$ for those who are self-employed and $S=0$ for those who are not. The C represents all the control variables together and the ε stands for the error term. The variables are observed for each unit i (i.e. individuals) in multiple periods t (i.e. years).

Even after including the control variables, there may be some omitted variable bias left in the error term. Omitted variable bias makes it challenging to establish the causal effects of self-employment on pension savings. Furthermore, there could be a possibility for reversed causality. In that case the amount of pension savings influences the probability of being self-employed. To tackle these two issues and to form a clearer picture, risk aversion and financial literacy are added to the regression analysis. Other scholars, as was discussed in the literature review, have shown that risk aversion and financial literacy influence both the probability of becoming self-employed and saving behavior. Adding risk aversion and financial literacy in the last step of the regression analysis will provide more information about how the coefficient of self-employment changes. The third regression equation looks as follows:

$$P_{it} = \beta_0 + \beta_1 S_{it} + \beta_2 C_{it} + \beta_3 R_{it} + \beta_4 F_{it} + \varepsilon_{it}$$

in which the R stands for risk aversion and the F stands for financial literacy.

A fixed effects estimation can be a good way to control for omitted variable bias. A fixed effect model is based on the assumption that the variables are time-invariant: they stay the same over time. However, risk aversion and financial literacy are possibly not time-invariant. People could improve their financial literacy with certain learning experiences in life or work. The value of risk aversion could also change over the years when certain events impact a person's perception of risk. Hence, a fixed effect estimation is not useful in my research. Instead I will use OLS with robust standard errors.

In addition to the third pillar pension savings, I include two extra dependent variables to see if the effect of self-employment is similar for different types of wealth. I run the same regression analysis with these other dependent variables. The first extra dependent variable is home ownership, a dummy variable in which people either do or do not own a house. The second dependent variable is total investments, which consists of growth funds, mutual funds, bonds, and stocks. These extra dependent variables are not only different factors of wealth, they could also be used as pension savings. Perhaps people do not use the third pillar products and

use other options to acquire a post-retirement income, such as instead investments or their house wealth. Hence, adding these extra dependent variables will provide a more complete picture of how the self-employed save for retirement.

V. Data

The data I use for this thesis, is derived from the DNB Household Survey. This is a longitudinal study conducted by CentERdata and is annually filled out online by 2000 households. Households receive an invitation from CentERdata based on a random national sample drawn. The panel selection is designed to accurately represent the Dutch-speaking population of The Netherlands. People who do not have access to a computer with internet, are provided with one to prevent selection-bias. Nonetheless, there are a couple of biases. There is overrepresentation of highly educated people, underrepresentation of single households, and underrepresentation of non-western foreigners (Teppa & Vis, 2012). Apart from these biases, the quality of the data is high. Regular review of the questionnaires, validity checks and consistency checks are performed to maintain the quality of the data (Teppa & Vis, 2012).

The DNB Household Survey focuses on the economic and psychological aspects of financial behavior and contains questions about wealth, income, and health. Because of this mutual focus on economic and psychological aspects, the DNB Household Survey provides the means to answer how financial literacy and risk aversion influence pension savings. The datasets of the last ten years (2009-2018) will be used for the research. This period is large enough to neutralize the effects of trends in the economy and changes in the panels.

All individuals who are in the working population will be included in the data. The aim of this thesis is to examine if self-employed save enough during their working life and if they differ in significant aspects from employees. People who are on average too young or too old to work will therefore be excluded from this research. The definition of OECD will be used, which states that the working population consist of people between the age of 15 and 65. This means that 7.951 observations that are below the age of 15 and 8.883 observations above the age of 65 are removed from the dataset.

In addition, there are many respondents who did not provide answers to all the questions. The first question with missing values was the one about whether or not respondents are self-employed. All 15.183 observations without an answer to this question are removed from the dataset to be able to make the distinction between self-employed and others. Furthermore, 2.679 observations with missing values for one of the risk aversion questions, 3 observations with missing values for the question about financial literacy, and 7 observations with missing values

for their level of education have been removed. Many respondents also failed to provide their income or stated an unrealistic low number (below 10.000 annually). As a result 7.103 observations have been removed. Also 4 outliers who earn more than 1 million euro a year have been removed. Two outliers with a total wealth of more than 2 million have been removed. The remaining number of observations is 5.539 of which 515 are self-employed. On average the respondents are observed over a period of 2,6 years.

V.I Operationalization of variables

In this section the main variables are defined and operationalized. An overview of all the variables can be found in table 7 of the appendix.

Dependent variables

There are multiple ways in The Netherlands to safe for retirement. In this thesis the focus is on the third pillar in the Dutch pension system. The third pillar consists of individual pension products, such as annuity insurances and endowment insurances. Annuity insurances pay out a certain amount of money periodically until the insured dies. Endowment insurances are a form of life insurances that pay out a lump sum to the insured on a previously agreed date (or at the moment of death if the insured dies before the agreed date). Insurance companies and banks provide these individual pension products. These two forms of insurances are used to determine private third pillar pension savings.

In the DHS dataset there is an aggregated dataset on assets, liabilities and mortgages. The aggregated data includes the total amount of savings through annuity insurances and the total amount of savings through endowment insurances on the individual level. By adding annuity insurances and endowment insurances, the total amount of savings in the third pillar can be calculated. However, not everyone who reported to own an annuity or endowment insurance also reported its' value. I therefore use the bracketed variables and imputed variables that are provided in the DHS dataset. The total amount of these savings is used as the main dependent variable.

Furthermore, I will look at house ownership and investments as dependent variables. House ownership is a dummy variable in which home owners get value 1 and others get value 0. For investments I will add the total sum of growth funds, mutual funds, bonds, and stocks and shares. These total amount of these investment options are also retrieved on the individual level from the aggregated dataset on assets, liabilities and mortgages.

Self-employment

The group of self-employed is quite broad and has many labels, such as freelancer, entrepreneur and independent contractor. The European Commission has defined self-employment as 'a person pursuing a gainful activity for their own account, under the conditions laid down by national law' (Directive 2010/41/EU). The main difference between self-employed and employees is that self-employed work on their own and have direct contracts with their clients, which means that they are not dependent on an employer. Furthermore, self-employed do not receive employee benefits, such as disability benefits and unemployment benefits. Lastly, self-employed pay taxes on their own and not through an employer. These differences are used to identify the self-employed. I make no distinction in this thesis between specific groups within the category of self-employment.

In the DHS dataset the question 'Were you (also) self-employed, working as a free professional or as a freelancer?' is asked. This question is present in all datasets for the different years and is therefore used to determine self-employment.

Risk aversion

The concept of risk preferences is based on expected utility theory. A utility function can be drawn in which an individual's preference for risk at different levels of payoffs is shown (Carter & Bao, 2005). A person can be risk averse, risk loving or risk neutral. Risk aversion has been defined by Qualls and Puto (1989, p. 180) as 'a preference for a guaranteed outcome over a probabilistic one having an equal expected value'. Most people tend to be risk averse, but there are great differences in how risk averse people are (Barr, 2012).

To measure risk aversion in this thesis, several questions of the economic and psychological concepts questionnaire are used. This DHS questionnaire contains six questions about saving and taking risks. On a scale of 1 to 7 respondents have to fill out to what extent they agree to statements, in which 1 is totally disagree and 7 is totally agree. Because this is a self-report scale it measures the stated preferences instead of revealed preferences. It is possible that there is a difference between the perception of a person and actual behavior. Because the DHS does not measure actual behavior, the self-perception scale will be used.

There are three statements in which a higher score reflects a more risk averse attitude. These three statements are: 'I do not invest in shares, because I find this too risky', 'I think it is more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns', and 'I want to be certain that my investments are safe'. There are also three statements in which a higher score means a less risk averse attitude.

14

These statements are: 'if I think an investment will be profitable, I am prepared to borrow money to make this investment', 'if I want to improve my financial position, I should take financial risks' and 'I am prepared to take the risk to lose money, when there is also a chance to gain money'. For the purpose of this research the answers to these six questions will be combined to create one average for how risk averse a person is. I want the average number for each person to reflect that the closer it is to 7 the more risk averse the person is and the closer the average is to 1 the more risk loving the person is. The questions in which a higher score means low risk aversion will therefore be recoded (7 becomes 1, 6 becomes 2 etc.).

Financial literacy

Remund (2010) combines research from different scholars to find the best definition for financial literacy. He concludes that financial literacy can be defined as (p. 284):

'A measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate, short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions.'

In the DHS dataset financial literacy can be measured with the question 'How knowledgeable do you consider yourself with respect to financial matters?'. Answers are given on a scale of 1 to 4, in which 1 is not knowledgeable, 2 is more or less knowledgeable, 3 is knowledgeable, and 4 is very knowledgeable. This is a very general question that does not capture the different aspects of financial literacy separately as defined by Remund. Furthermore, as was the case with risk aversion, the question is based on self-perception. The perception of financial literacy can differ from actual financial behavior. Because of the broad scope of the question and because it is based on self-perception, the validity of financial literacy in this research might be limited. However, the DHS dataset does not contain questions in which it tests the financial literacy of its respondents in a different way. Hence, the self-perception of financial knowledge is used in this research.

Control variables

The control variable age is defined in years. Gender is a dummy variable, in which women receive the value 0 and men the value 1. To measure health, the question 'In general, would you say your health is excellent (5), good (4), fair (3), not so good (2), or poor (1)' is used. Education is divided in 9 categories in the DHS dataset. For my research I create a dummy variable for education, in which higher education gets the value 1 and the rest gets value 0.

People fall into the category of higher education if they have a diploma from a research university or a university of applied sciences. The total amount of net household income is provided for each respondent. Number of children ranges from 0 to 6, as there is no one in the dataset with more than 6 children. Partner is a dummy variable: people with a partner receive value 1 and without a partner value 0.

V.II Summary statistics

Table 1 details the descriptive statistics for self-employed and employees. The self-employed are slightly younger, healthier, have more children and are more often male than employees. A large difference can be seen in education. From the employees 44% has finished higher education while for the self-employed this is 55%. Furthermore, there is a small difference in income. Self-employed more often belong to a household with a higher income than employees. With regard to wealth, a large difference can be seen between employees and self-employed. The self-employed have almost double the amount of wealth that employees have. It must be noted that the standard deviation for both groups is very high, which means that there is a lot of variability within the data. This is no surprise as self-reported wealth data is usually noisy. The average third pillar pension savings are higher for the self-employed than for employees. The standard deviation is also quite high for both groups.

Table 1: Differences between employees and self-employed

	Employees	Sd	Self-employed	Sd
N	5.024		515	
Gender male	59,99%		63,73%	
Higher education[1]	44,02%		55,40%	
Health[2]	3,91	0,69	3,97	0,69
Age	55,59	13,17	53,77	12,73
Number of children	0,54	0,98	0,60	1,04
Partner[3]	0,79	0,40	0,75	0,43
Household income[4]	€ 26.251	€ 15.255	€ 28.504	€ 19.073
Wealth[5]	€ 57.036	€122.295	€ 93.751	€ 180.572

Third pillar savings[6]	€ 5.793	€ 30.335	€ 7667	€ 30.138

[1]Percentage of people who has a diploma from a research university or a university of applied sciences.

[2]Health is measured on a scale of 1 to 5 in which 1 is poor health and 5 is excellent health.

[3]A partner in the household=1 no partner in the household=0

[4]The household income is equivalized with the OECD equivalence scale. A weight of 1 is assigned to the first adult, a weight of 0,5 to the second adult, and a weight of 0,3 to each child in the household. The total net income is divided by the total weight of the household.

[5]For the operationalization of wealth the definition of Hurst and Lusardi (2004, p. 324) will be used. They define wealth as 'the sum of savings and checking accounts, bonds, stocks, individual retirement accounts, housing equity, other real estate, and vehicles, minus all debt'.

[6]Third pillar savings are annuity and endowment insurances. From the 7702 respondents 1609 have third pillar savings. From the 651 self-employed respondents 172 respondents have third pillar savings.

Risk aversion

Table 2 shows the differences between self-employed and employees in terms of risk preferences. The self-employed score lower on risk aversion than employees as can be seen in the lower mean that self-employed have. There is a higher percentage of employees with a high score on risk aversion (6 and 7) than there is for self-employed. To see if this difference is significant, I compared the means with a t-test.[1] The p-value of the test is a lot smaller than 0,05. I can therefore reject the null hypothesis that there is no difference between the two groups and conclude that the difference in means is significant. This outcome is in line with my expectation that self-employed are in general less risk averse.

Table 2: Risk preferences towards saving

	Employees	Self-employed
N	5.024	515
totally risk loving (1)	0,04%	0,15%
moderately risk loving (2)	0,98%	1,86%
slightly risk loving (3)	8,57%	9,56%
risk neutral (4)	25,21%	27,63%
slightly risk averse (5)	33,60%	34,26%

[1] The table for the difference in means is provided in the appendix

moderately risk averse (6)	23,80%	20,52%
totally risk averse (7)	7,80%	6,02%
mean	5,24	5,11
sd	1,05	1,05

Financial literacy

Table 3 shows the scores for self-employed and employees on financial literacy. The self-employed more often indicated that they are financially knowledgeable than employees. The mean is higher for self-employed than for employees. A t-test is used to test if the difference in means is significant. Similar to risk aversion am I also able to reject the null hypothesis and confirm that the difference in means is significant.[2] The expectation that self-employed are more financially literate than employees is thus confirmed by the data.

Table 3: Financial literacy

	Employees	Self-employed
N	5.024	515
not knowledgeable (1)	12,59%	8,49%
more or less knowledgeable (2)	53,55%	51,85%
knowledgeable (3)	28,89%	32,41%
very knowledgeable (4)	4,96%	7,25%
Mean	2,28	2,4
Sd	0,74	0,74

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[2] The table for the difference in means is provided in the appendix

VI. Results

Table 4 details the effects of self-employment, the control variables, risk aversion and financial literacy on third pillar pension savings. Initially self-employment has a weak significant effect on third pillar pension savings. The average amount of third pillar savings is 6.308. The increase of 2.740 in third pillar pension savings for people who are self-employed is in that light large. However, the significant effect disappears when control variables are added to the regression equation. All control variables, with the exception of number of children have a significant effect on third pillar pension savings. The relationships are all positive. This means that being male, having a higher education, having a better health, being older and having a higher income increase third pillar pension savings. In the third step of the analysis when risk aversion and financial literacy are added, the significance of health disappears. Risk aversion has a negative significant relationship with third pillar pension savings. This means that the more risk averse a person is the less third pillar pension savings that person has. Financial literacy has a positive significant relationship with third pillar pension savings. The more financially literate a person is the more that person saves in the third pillar.

Table 4: Regression analysis third pillar pension savings

	(1)	(2)	(3)
Self-employment	2.740,47* (1.523,84)	2.135,28 (1.508,94)	1852,52 (1.511,99)
Gender		4.102,19*** (918,77)	2991,35*** (896,91)
Higher education		3220,34*** (1.107,40)	2743,54*** (1.048)
Health		1124,88* (648,07)	891,89 (644,64)
Age		303,15*** (45,20)	324,75*** (47,09)
Number of children		-62,88 (485,38)	-63,86 (382,09)
Partner in the household		-1038,70 (1.160,7)	-939,26 (1.150,06)

Household income		0,03** (0,01)	0,02* (0,01)
Risk aversion			-916,37** (453,28)
Financial literacy			2.310,8*** (791.93)
Constant	6.052,77*** (543,8)	-17.559,74*** (4.166,99)	-17.140,16*** (4859,46)

*p<0,1 **p<0,05 ***p<0,01

To see what the effect of self-employment is on other types of wealth, I use home ownership as the dependent variable instead of third pillar pension savings. Table 5 shows the results of the same regression analysis but with home ownership as the dependent variable. The effect of self-employment is not significant in any of the steps of the analysis. All the control variables do have a significant effect in the second model. Older males with a higher education, better health, more children, a partner in the household, and a higher income more often own a house. When risk aversion and financial literacy are added in the third step, gender loses its significance. Risk aversion has a weak significant effect on home ownership. The relationship is negative which means that people who are more risk averse are less likely to own a house. Financial literacy has a strong positive significant effect. The more financially literate a person is the greater the chance that the person owns a house.

Table 5: Regression analysis home ownership

	(1)	(2)	(3)
Self-employment	0,01 (0,02)	-0,01 (0,02)	-0,02 (0,02)
Gender		0,03* (0,02)	0,01 (0,02)
Higher education		0,07*** (0,02)	0,06*** (0,02)
Health		0,05*** (0,01)	-0,04*** (0,01)

Age		0,00*** (0,00)	0,00*** (0,00)
Number of children		0,04*** (0,01)	0,04*** (0,01)
Partner in the household		0,2*** (0,03)	0,2*** (0,03)
Household income		0,00*** (0,00)	0,00*** (0,00)
Risk aversion			-0,01* (0.00)
Financial literacy			0,03*** (0,01)
Constant	0,8*** (0,01)	0,16** (0,07)	0,17** (0,09)

*p<0,1 **p<0,05 ***p<0,01

Furthermore, I look at the effect of self-employment on investments. Perhaps the self-employed do not necessarily save through third pillar products but they might acquire post-retirement income by investing in mutual funds, bonds and stocks. Table 6 shows the results of the regression analysis with investments as the dependent variable. The mean for investments is 6.659 which means that being self-employed increases the investments with a bit less than one sixth. However, the effect of self-employment is not significant in the analysis and the coefficient for self-employed becomes even negative but still not significant when control variables are added. All the control variables except for number of children and partner in the household have a significant effect. The effect for health disappears and the effect for gender becomes weaker when risk aversion and financial literacy are added to the analysis. Older males with a higher education, and a higher income have a higher value of total investments. Especially the coefficient for higher education is large. Risk aversion has a negative significant relationship with investments. This means that the more risk averse a person is the lower the value of its investments is. Financial literacy has a positive significant relationship with investments. This means that the more financially literate a person is the greater the value of the total investments is.

Table 6: Regression analysis investments

	(1)	(2)	(3)
Self-employment	933,51 (1.872,14)	-264,17 (1897,79)	-919,94 (1.859,57)
Gender		5.027,09*** (1.276,92)	2.137,96* (1.160,6)
Higher education		7.177,74*** (1.686,81)	6.190,4*** (1.558,81)
Health		1.575,1* (817,24)	1.213,95 (802,13)
Age		413,99*** (85,55)	471,67*** (88,6)
Number of children		-101,23 (592,16)	-134,91 (576,48)
Partner in household		-2.641,96 (1.920,98)	-2.189,59 (1.835,29)
Household income		0,07** (0,03)	0,05** (0,02)
Risk aversion			-4.060,34*** (618,29)
Financial literacy			2.953,83*** (926,6)
Constant	6.572,47*** (787,04)	-27.111,6*** (6.268,50)	-11.638,02** (5.805,34)

*p<0,1 **p<0,05 ***p<0,01

The results show that the relationship between self-employment on the one hand and third pillar savings, home ownership and investments on the other, are not significant. There is no difference between self-employed and employees despite the fact that relationships between risk aversion and financial literacy and each of the independent variables are significant.

VII. Conclusion

With this thesis I aimed to contribute to the public administration literature by clarifying which factors are important determinants for the saving behavior of self-employed. I examined the research question *What is the effect of risk aversion and financial literacy on the savings for retirement of self-employed?*

I expected that risk aversion and financial literacy would have a relation to both self-employment and pension savings and would therefore be important in explaining the effect of being self-employed on pensions savings. Consistent with previous literature (Ekelund et al., 2005; Ćumurović and Hyll, 2019), I found that self-employed are less risk averse and more financially literate than employees. This confirms the idea that there are significant differences between self-employed and employees.

I found a significant negative relationship between risk aversion and pension savings. This negative relationship was surprising because previous research had shown (Bommier, Chassagnon and Le Grand, 2012) that more risk aversion leads to more savings for the future. However, in my research more risk aversion leads to less savings. In addition, I used home ownership and investments as dependent variables. The results also showed a negative relationship between risk aversion and the additional dependent variables. An explanation could be that people who are more risk averse do not put their money into pension products, a home, or investments but instead leave their money on a checking or savings account for it to be more easily accessible in times of need. Not having immediate access to the money and not knowing its eventual value, might be too risky for risk averse people.

I found that there is a significant positive relationship between financial literacy and pension savings. This is in line with the theory that people who are more financially knowledgeable save more (Lusardi and Mitchell, 2010; Van Rooij et al., 2011). I also found a positive significant relationship for home ownership and investments.

While self-employed are on average more financially literate and less risk averse than employees, this does not lead to higher pension savings. The results of the OLS showed that without controls self-employment was weakly correlated with third pillar savings. The coefficient was positive which means that self-employed have more savings than employees. However, the significant relationship disappeared when I added the control variables, and risk aversion and financial literacy to the regression. The results showed that there was no difference in third pillar pension savings between self-employed and employees.

Interestingly, with home ownership and investments, the coefficient for self-employment becomes negative when I add control variables. This means that self-employed are less likely to own a home and have less investments. However, the relationship is not significant. No difference between self-employed and employees can be established. The fact that the self-employed do not save more for their retirement through third pillar pension savings, and also do not own a house or investments, which could also be used for a post-retirement income, confirms the findings of Mastrogiacomo, and Alessie (2015) that there is a retirement saving problem for self-employed.

VII.I Limitations and suggestions for further research

While this research has contributed to the understanding of the effect of self-employment on pension savings, it also has some limitations that should be addressed in future research. The first limitation that I encountered is that a substantial part of the respondents did not fill in all the questionnaires of the DHS dataset. As a consequence, I did not have enough information about some participants to include them in my study. The problem is that there might be bias in who did and who did not fill out the questionnaires. It would be useful if this nonresponse could be reduced in future research to see if the same results are achieved.

Another limitation of using the DHS survey data is that the answers are based on self-assessment and not actual behavior. For example, with risk aversion, respondents have to answer how much they agree with statements about (not) taking risks. Future research could let the respondents play a virtual game in which they would have to make certain choices in situations with different forms and levels of risk. Financial literacy is only measured in the DHS survey with how knowledgeable the respondents consider themselves with respect to financial matters. People can under- or overestimate their own abilities. In future research, financial literacy could be established by questions that test if respondents can apply financial information appropriately. The application of financial information could possibly also be tested in a virtual game. By using actual behavior and actual knowledge instead of self-assessment, the validity of the research could increase.

My study has focused on the self-employed as one group. However, self-employed group is heterogeneous. There might be subgroups within the self-employed category that differ significantly from each other. For example, you have those who switch to self-employment out of necessity because they are unemployed, or you have those who switch to self-employment while already employed because they see an opportunity. The different motive for switching to

self-employment might be accompanied by further differences between those two groups, such as differences in risk aversion and financial literacy. Another possibility for future research is to look at different sectors that the self-employed work in, such as the cultural sector or industry. Some trends might be more visible for certain sectors within the self-employed group. Hence, it would be useful if questions about the motive for becoming self-employed and the sector in which self-employed work are added to the DHS dataset. The relationship between self-employment and pension savings might become more clear by identifying these subgroups.

This research has specifically focused on risk aversion and financial literacy as factors that influence both self-employment and saving behavior. Nonetheless, there might be more individual factors worth exploring in future research, for example cognitive ability. Furthermore, it would be useful to not only look at individual factors but also at institutional factors, such as institutionalized saving incentives, financial education, and the promotion of saving behavior. Finally, a qualitative study in which self-employed are asked about their saving behavior and their opinion on the Dutch pension system, would provide a different angle on the pension saving problem of self-employed.

VII.II Policy implications

The results of this study show that self-employed do not differ from employees in their third pillar pension savings. This is a problem because the self-employed do not save automatically through the second pillar of the pensions system as the employees do. The self-employed need to make deliberate choices to acquire a sufficient post-retirement income. The fact that they do not save more through third pillar products means that they have a lot less saved in the first three pillars of the Dutch pension system than employees.

A lack of third pillar pension savings could be compensated by the unofficial fourth pillar that consists of private savings and housing wealth. While these forms of savings and wealth are not specifically reserved for post-retirement income, they could be used as pension savings. However, the results of this study showed that self-employed do not own a house more often and do not have more investments than employees. Thus, the self-employed also lack alternative pension savings. Ideally everyone has a sufficient post-retirement income. Because the self-employed do not save enough in a system where they need to make their own pension decisions, the Dutch pension system should be changed to better assist the self-employed in acquiring a sufficient post-retirement income.

An option to improve the pension system could be to provide the self-employed with more and possibly collective pension products. The self-employed might not be satisfied with the current pension products in the third pillar. Changing this, could stimulate them to save more. However, it could also work counterproductive, because providing the self-employed with more options might make them feel overwhelmed by the financial decisions they need to make. Offering guidance for self-employed in making their decisions could solve this problem. However, this is an expensive solution because the advice would need to be tailored for all individuals as they have different financial situations and needs.

The Dutch government has also realized that a change is needed to ensure that the growing and substantial group of self-employed has a sufficient post-retirement income. The government wants to enable the self-employed to save through the second pillar. The government announced in June 2019 in their agreement on pension reforms that the self-employed can voluntarily join a pension fund in the second pillar. A problem with this solution might be that self-employed are less risk averse than employees and therefore might be less inclined to choose this more stable option over other ways of saving. Self-employed might need a bigger incentive to save through the second pillar.

A rigorous way of ensuring that self-employed will save through the second pillar is by making it mandatory. Employees and self-employed will be treated exactly the same in this system. There are already some groups of self-employed, such as painters, who are obliged to save in the second pillar through collective funds. This same obligation could be applied to the rest of the self-employed. The disadvantage of making it mandatory for self-employed, is that it is politically unpopular. The idea of forcing self-employed to save for their pension is often rejected by the argument that self-employed specifically choose for self-employment to have more freedom and less rules.

A way to overcome this problem is to create an opt-out saving system. With an opt-out system the self-employed will safe automatically in the second pillar but they will have the option to withdraw from this saving method. Research shows that people tend to choose for the default option because it takes more effort to deliberately choose for something else (Lodge & Wegrich, 2012). Furthermore, people assume that because it is the default option, it is the normal and therefore best option (Lodge & Wegrich, 2012). If we make saving through the second pillar the default option for self-employed, the expectation is that most of them will participate in this system. The result will be that on average the self-employed will save more for their pension. At the same time, you are not taking the freedom away from self-employed because they will still have the decision to stop participating. The opt-out system has a better

chance of success than the current reform of the government, which is more similar to an opt-in system. The opt-out pension system could close the gap between self-employed and employees by increasing post-retirement income for self-employed.

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Appendix

Table 7: Definition and measurement of the variables

Variable	Definition
Age	Age in years
Financial literacy	Self-perception of how financially literate the respondent is on a 4-point scale: not knowledgeable=1, more or less knowledgeable=2, knowledgeable=3, very knowledgeable=4
Gender	Male=1 female=0
Health	Self-perception of how good the health is of the respondent on a 5-point scale: poor=1, not so good=2, fair=3, good=4, excellent=5
Higher education	Respondents with a research university or an applied sciences university diploma=1 others=0
Home ownership	Owns a home=1 others=0
Household income	Total amount of equivalized household income
Investments	Total amount of individual investment products: growth funds, mutual funds, bonds, and stocks and shares
Number of children	Number of children in the household
Partner	Partner present in the household=1 no partner=0
Risk aversion	Self-perception of how risk averse the respondent is on a 7-point scale: totally risk seeking=1 to totally risk averse=7
Self-employment	Self-employed=1 others=0
Third pillar pension savings	Total amount of individual pension products: annuity insurances and endowment insurances
Wealth	Total amount of individual wealth

Table 8: T-test Risk aversion

	N	Mean	SE
Employees	5.024	5,24	0,01
Self-employed	515	5,11	0,05
Difference	5.539	0,13	0,05
T-value = 2,87 P-value = 0,00			

Table 9: T-test Financial literacy

	N	Mean	SE
Employees	5.024	2,28	0,01
Self-employed	515	2,4	0,03
Difference	5.539	-0,12	0,03
T-value = -3,54 P-value = 0,00			