

Does pension awareness reduce pension concerns?

Causal evidence from the Netherlands

Jordi Spruit



DOES PENSION AWARENESS REDUCE PENSION CONCERNS?

Causal evidence from The Netherlands



JUNE 11, 2018

LEIDEN UNIVERSITY

Master thesis Public Administration: Economics & Governance

Author: Jordi Spruit (s1579835)

Supervisor: Prof. Dr. M.G. Knoef

2nd Reader: Dr. N.A.J. van der Zwan

Summary

Three-quarters of Dutch employees are concerned about their pension situation. The government and pension funds are struggling to increase the trust of society in the pension system and reduce their concerns. Existing literature shows that the financial- and pension literacy is low, while it is clearly interrelated with retirement planning and financial concerns. However, these findings are based on associations, only few studies attempted to uncover causal relationships. This research tries to uncover the causal effect of pension awareness on pension concerns, by applying an instrumental variable approach using micro data on Dutch citizens. In this study, pension awareness consists of two components, namely knowledge on the pension system and knowledge on the personal pension situation. The instrument used to uncover the causal effect is a randomly sent letter containing pension information. The data are derived from the PanelWizard survey on pension awareness for individuals aged 20 to 64. In the estimation results, evidence is found of a significant negative effect of pension awareness on pension concerns. Both pension knowledge and knowledge on the personal pension situation reduce pension concerns. Furthermore, this study examines heterogeneous effects with regard to gender. Results show that the negative effect of pension knowledge on pension concerns is stronger for men than for women. While the negative effect of knowledge on the personal pension situation on pension concerns is stronger for women than for men. These findings have implications for pension policy in the coming pension reform. The government can consider improving the pension awareness of society to reduce their concerns.

Contents

1. Introduction.....	1
2. Theoretical framework.....	4
2.1 Lifecycle model of consumption	4
2.2 Financial literacy.....	4
2.3 Pension literacy	5
2.4 Financial and pension literacy in the Netherlands.....	6
2.5 Differences in financial and pension literacy between men and women.....	7
2.6 Framing in increasing pension literacy.....	8
2.7 Hypotheses.....	8
3. Method.....	10
4. Data	13
4.1 Descriptive statistics.....	13
5. Results	19
5.1 Correlation between pension awareness and pension concerns	19
5.2 Effect of pension awareness on pension concerns	19
5.3 Marginal effects of pension awareness on pension concerns	22
5.4 Heterogeneous effect.....	23
5.5 Sensitivity analysis.....	23
5.6 Analysis of the hypotheses.....	24
6. Conclusion, discussion and recommendations	26
6.1 Conclusion	26
6.2 Discussion	27
6.3 Recommendations	28
Reference list.....	30
Appendix A: Positively framed letter	34
Appendix B: Negatively framed letter.....	35
Appendix C: Knowledge questions on the pension system	36

1. Introduction

The sustainability of the pension system is a politically sensitive topic. The pension system is under pressure due to the increasing life expectancy, decreasing interest rates and the ageing of society. Adjustments are being made which disappoints large parts of society, like raising the retirement age. More recently, the new pension agreement in The Netherlands between the employers' association and trade unions was leaked into the media (Van Raalte & Kars, 2018). This agreement seems to be beneficial for both employees who approach the retirement age and employers. Consequently, the concerns of younger employees about their pension only increased.

Pension funds and insurance companies are under a lot of pressure (Pensioenfederatie, 2016). The financial literacy in society is low, which results in decreased trust in the government, pension funds and insurance companies. In 2017, members of the Dutch pension funds rated their trust in the fund with a 6,1 on average. Moreover, three-quarters of employees are concerned about their own pension (Mercer, 2017). However, Knoef et al. (2016) show that only one-third of the Dutch citizens have inadequate pension accrual. Therefore, a large part of society has unjustified concerns about their pension. Part of the reason for this low level of trust lies within the pension system. Society doubts whether there is still a pension when they reach the retirement age. This doubt arises from wrong assumptions about the system (Pensioenfederatie, 2016). The government and pension funds are struggling to increase the trust of society in the pension system. They are eager to find effective and efficient solutions to the problem.

Financial literacy is a subject that is already thoroughly studied. The conclusion of these studies - in general - is that households lack the knowledge to save optimally, and do not have the capacity to undertake complex economic calculations and expertise in dealing with financial markets (Lusardi & Mitchell, 2011a). Furthermore, society on average has a low pension awareness, which can be seen as little knowledge on the pension system in a country (Lusardi & Mitchell, 2011a). In addition, it can be seen as little knowledge on the personal pension situation (Chan & Stevens, 2008). Financial and pension illiteracy is especially overrepresented among women and low educated, low income, non-working and young individuals (Lusardi & Mitchell, 2014). Financial literacy is an antecedent to various healthy financial behaviors. Confidence seems an important factor when it comes to pension literacy. Only a minority of American households feel "confident" about their retirement saving adequacy, while little is known about why people fail to plan for

retirement. Lusardi and Mitchell (2011c) show that those who are confident on their knowledge and saving behavior are able to succeed in planning for retirement. People with financial literacy have less concern regarding their pension situation (Taft et al., 2013). However, this is only based on associations, evidence of a causal effect of pension awareness on pension concerns seems to be absent in existing literature. Therefore, the research question is as follows:

“To what extent does pension awareness effect pension concerns?”

The goal of this research is to estimate the causal effect of pension awareness on pension concerns. This research tries to improve the knowledge on financial literacy in the form of pension literacy, and tries in addition to expose significant differences with regard to gender. An issue with financial literacy research is establishing a causal relationship, since financial literacy is an endogenous concept. This implies that both simultaneity and third factors may play a role. There is a possibility that pension concerns have an effect on pension awareness. In addition, there may be other unobserved characteristics that explain the effect. This study uses randomly sent letters with pension information as an instrument to address to these problems. Only few studies previously examined actual causal effects. Therefore, this study contributes to the literature by examining the causal effect of pension awareness on pension concerns, by using micro data of Dutch citizens.

Furthermore, the conclusions of this research can have several implications for society. If increasing pension awareness leads to less pension concerns, this can be valuable knowledge for the government and pension funds. As they are struggling to increase the trust of Dutch citizens, they might consider improving the pension awareness of society. If the government can persuade society to increase their effort put in their retirement plan, people might start saving at a younger age. Individuals can invest in themselves to improve their pension literacy. An increase in behavior associated with adequate pension accrual may lead to an increase in the sufficiency of pensions at the retirement age. Furthermore, the Dutch government might consider their options for the coming pension reform. Raising financial literacy of society, or specifically pension literacy, can be a cheap alternative compared to increased government spending on the pension pillars.

To conduct this research, first a theoretical framework is constructed in chapter two. In this framework, the concepts of interest are introduced and elaborated on. This uncovered the mechanisms and possible effects of pension awareness on pension concerns, which are used as a framework to construct hypotheses. Chapter three describes what method is used to conduct this

research, namely an instrumental variable approach. Chapter four shows the data and descriptive statistics based on the data from the PanelWizard survey on pension awareness. Then, chapter five presents the estimation results alongside the analysis of the hypotheses. Finally, in chapter six this study ends with a conclusion in which the research question is answered. The conclusions are discussed alongside with recommendations for further research.

2. Theoretical framework

This chapter contains of an overview of existing literature on the topic. The concepts of interest are elaborated on. Then the mechanisms are explained which describe the way in which pension awareness is expected to affect pension concerns. The chapter ends with three hypotheses that contain expectations on the sample and heterogeneous groups.

2.1 Lifecycle model of consumption

The lifecycle model is a model that economists use to analyze the distribution of time, effort and money, related to a specific subject. It can relate to all kinds of choices that an individual makes, such as consumption, savings, labor or education. Modigliani & Brumberg (1954) state that the simplest version of the lifecycle model of consumption without bequests and uncertainty posits that households accumulate savings during their working careers up to retirement, and decumulate wealth thereafter. The lifecycle model of consumption assumes that consumption is smoothed over a lifetime (Browning & Crossley, 2001). However, studies have shown that there are numerous reasons why household consumption and wealth deviate from the predicted path from the lifecycle model. Among those reasons are longevity and bequests, unexpected events, health related problems, precautionary saving and economic opportunities in different cohorts (Lusardi, 2003). Summarizing, consumption patterns are strongly dependent on consumer preferences. Furthermore, one of the most important reasons why individuals seem to deviate from the lifecycle model is financial literacy (Bernheim, 1998).

2.2 Financial literacy

Financial literacy is a broad concept and requires clarification. In this research, the definition of Remund (2010: 284) is used;

“Financial literacy is 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.”

Financial literacy is a concept that is broadly studied in many countries¹. The conclusion of these studies - in general - is that households lack the knowledge to formulate and execute saving and

¹ Australia (Agnew et al., 2013), The Netherlands (Alessie et al., 2011), Sweden (Almenberg & Save-Soderberg, 2011), France (Arrondel et al., 2013), Romania (Beckmann, 2013), Canada (Boisclair et al., 2015), Switzerland

spend-down plans, and do not have the capacity to undertake complex economic calculations and expertise in dealing with financial markets (Lusardi & Mitchell, 2011a). Especially, financial illiteracy is overrepresented among women and low educated, low income, non-working and young individuals (Lusardi & Mitchell, 2014). Financial literacy is an antecedent to various healthy financial behaviors (Fernandes et al., 2014). Thus, financial illiterate households make worse financial decisions than financial literate households. This is known to have consequences for the short term, and more important, during retirement (Van Rooij et al., 2012).

Since the start of the economic crisis in 2008, many households were financially harmed. This caused an increased interest in financial literacy in households. However, the crisis also caused society to lose their confidence in the financial sector. Governments noticed the importance of financially educating society. When governments make financial decisions, it is important that society understand basic concepts of the financial system. This may also increase the confidence in the financial sector (Lusardi et al., 2017).

Taft et al. (2013) conducted research on the relation between financial literacy, financial wellbeing and financial concerns. Financial concerns appear when someone cannot meet his financial needs or his assessment of financial status is not good. Results show that individuals are more sensitive to short term financial concerns compared to the long term. Taft et al. (2013) find a negative relation between financial literacy and financial concerns. When someone has higher financial literacy and -wellbeing, financial concerns are reduced. They use a questionnaire to measure financial literacy and financial concerns. Financial concern is measured through several statements on which the respondents answered to what extent they agreed on a five-point Likert scale.

2.3 Pension literacy

One of the key components of financial literacy is knowledge on the pension system. The concept “pension literacy” is not yet commonly used in the literature. However, pension knowledge and retirement decision-making are heavily debated. Especially in countries where the pension system is under pressure because of the ageing of the population (Lusardi & Mitchell, 2012). Chan & Stevens (2008) find that households base pension and retirement saving decisions upon limited and sometimes incorrect pension knowledge. Many households are unfamiliar with even the most basic

(Brown & Graf, 2013), Germany (Buchner-Koenen & Lusardi, 2011), New Zealand (Crossan et al., 2011), Italy (Fornera & Monticone, 2011), Russia (Klapper & Panos, 2011), United States (Lusardi & Mitchell, 2011b) & Japan (Sekita, 2011).

economic concepts needed to make sensible saving and investment decisions. This has serious implications for saving, retirement planning, retirement, mortgage, and other decisions (Lusardi & Mitchell, 2007).

The literature shows that employees know very little about their pension plan (Luchak & Gunderson, 2000; Chan & Stevens, 2008). Chan & Stevens (2008) state that few individuals are aware of their personal pension situation. Lusardi & Mitchell (2011c) show that only a minority of American households feel “confident” about their retirement saving adequacy, while little is known about why people fail to plan for retirement. One-third of the respondents ever tried to devise a retirement plan. While only one-fifth claims they engaged in successful retirement planning. Lusardi & Mitchell (2011c) also show that financial knowledge and planning are clearly interrelated. Individuals with financial knowledge are more likely to plan, and succeed in their planning. Confidence seems an important factor when it comes to financial or pension literacy. Those who are confident on their knowledge and saving behavior are able to succeed in planning for retirement. Lusardi and Mitchell (2011c) show that people with financial literacy have less concern regarding their pension situation. Based on the literature, this study makes use of the concept “pension awareness”, which consists of two components. First, there is the knowledge on the pension system, and second there is the knowledge on one’s personal pension situation.

[2.4 Financial and pension literacy in the Netherlands](#)

Alessie et al. (2011) explain in their research that the financial literacy among respondents in The Netherlands is among the highest of participant countries in the international project on financial literacy around the world. However, they conclude as well that it cannot be expected that the Dutch are better equipped to make financial decisions. The comparison between countries may be affected by many factors, like institutions or survey methods. The Dutch pension system is often set as an example for other countries (Alessie et al., 2011). Knoef et al. (2016) and Knoef et al. (2017) explain in their research the Dutch pension system and its adequacy. The Dutch pension system consist of three pillars. The first pillar is a pay-as-you-go financed state pension (AOW), which provides a flat, relatively generous benefit from the retirement age. The second pillar consists of capital-funded occupational pensions, of which the primary responsibility lies with employers and employees. Private individual pension products and other private savings form the third pillar (Knoef et al., 2016). There are several ways of defining the adequacy of pensions (Knoef et al., 2017). For example, it can be a percentage of the last earned wage, or a socially accepted standard.

The Dutch pensions are generally known as adequate (Alessie et al., 2011). However, Knoef et al. (2016) conclude that the adequacy is somewhat less promising when using micro data.

Dutch pension funds and insurance companies are confronted with structural developments that put them under pressure (Knoef et al., 2017). Among these developments are; the increasing life expectancy, decreasing interest rates and the ageing of society. These negative developments only worsened during the financial crisis from 2008 until 2012, which increased the concerns among Dutch citizens regarding their pension situation (Knoef et al., 2017). To take away these concerns, the government tries to improve the financial literacy of society. The Treasury department set up initiatives to increase financial awareness and skills of Dutch consumers (Van Rooij et al., 2011). Van Rooij et al. (2011) make use of a multivariate regression analysis, attempting to establish a causal effect of financial sophistication and retirement planning. They measure financial literacy through a set of knowledge questions. Retirement planning is measured through a question about how much someone thinks about retirement. They conclude that financial sophistication boosts retirement planning (Van Rooij et al., 2011). Another study by Alessie et al. (2011) makes use of an instrumental variable regression to show that financial literacy is an important determinant of retirement planning. They use the financial knowledge of parents and siblings as an instrument to uncover the causal effect. Financial literacy is measured as well through a set of knowledge questions, and retirement planning is measured by asking about their saving behavior. Lusardi and Mitchell (2007) also explain that retirement planning can be improved by financial education. Financial education can increase the amount of time spend on a sound pension plan, and decrease the concerns about the pension situation.

2.5 Differences in financial and pension literacy between men and women

The literature shows that there is a “gender gap” in financial literacy between men and women (Chen & Volpe, 2002; Lusardi & Mitchell, 2008; Bucher-Koenen et al., 2017). While financial literacy is particularly important for women, as they tend to outlive men. For single women and widows it is important to understand the basic concepts of the financial system, as they have no partner or spouse to consult when making financial decisions. Chen & Volpe (2002) observed that women generally have less enthusiasm, lower confidence and less willingness to learn, when it comes to financial literate topics. Moreover, Lusardi & Mitchell (2008) explain that the large majority of women have not done any retirement planning calculations. However, women who display higher financial literacy are more likely to plan and be successful planners. Bucher-Koenen

et al. (2017) show that most women are aware of their financial illiteracy, as they rate themselves low on a financial literacy scale. In addition, they also explain that women are more likely to vote for the “do not know” option in financial literacy tests. However, financial education programs seem to be particularly successful for women. Clark et al. (2006) provide evidence that women are more likely to change their behavior after attending a seminar on retirement planning. It is effective to target men and women separately in financial education in terms of financial knowledge and financial behavior.

2.6 Framing in increasing pension literacy

Several studies focus on the role of framing in educating society. Kahneman (1979) developed the prospect theory, which states that people make decisions based on the potential value of losses and gains rather than the final outcome, while using heuristics. Eberhardt et al. (2017) make use of this theory and apply it to a contemporary case. They conclude that loss frames result in stronger reactions, since losses outweigh gains. Furthermore, they state that an assurance frame can be twice as effective as an investment frame. The investment frame – the gain alternative – emphasizes that pension plan participants can gain by investing in their future and searching for information. By contrast, the assurance frame – the loss alternative – stresses that participants can prevent negative consequences through the sense of security that they obtain when learning about their expected pension benefits (Eberhardt et al., 2017). Other literature confirms that negative framing is generally more effective than positive framing, concerning pension saving (Agnew et al., 2008; Hastings et al., 2011; Bateman et al., 2015). However, negative framing also has a downside since it might increase concerns and scare off participants (Eberhardt et al., 2017).

2.7 Hypotheses

The literature shows that increasing financial literacy has a positive effect on retirement planning, and a negative effect on financial concerns. Financial literate individuals are more likely to put more time and effort in their retirement plan, which results in a decrease in the pension concerns. Furthermore, confidence on the personal pension plan may take away someone’s concerns regarding his pension situation. Pension funds and insurance companies are eager to know whether increasing pension literacy can take away these concerns. As stated before, the concept “pension awareness” consists of two components, namely knowledge on the pension system and knowledge on the personal pension situation. Based on this concept, two hypotheses are developed to test whether there is a causal effect of pension awareness on pension concerns. It is expected that an

increase in pension awareness will result in a decrease in pension concerns. Furthermore, a third hypothesis is added to measure the heterogeneous effects with regard to gender. The literature shows that women are less financial literate than men are. This is expected to result in higher pension concerns for women.

H1: There is a negative causal relation between pension knowledge and pension concerns. Pension knowledge is measured through the number of correct answers out of five basic multiple-choice questions on the pension system.

H2: There is a negative causal relation between knowledge on the personal pension situation and pension concerns. Knowledge on the personal pension situation is measured through whether a respondent recently logged in at www.mijnpensioenoverzicht.nl, to check his pension situation.

H3: The effects of pension awareness on pension concerns are larger for men compared to women.

3. Method

This research presents a quantitative analysis on the effect of pension awareness on pension concerns. However, the relation between the dependent and independent variables might be endogenous. The problem of endogeneity is twofold. The first issue is that the relation may consist of reverse causality (Toshkov, 2016). The pension awareness of an individual may affect pension concerns, but it is also possible that the relation is the other way around. In that case, pension concerns would increase someone's pension awareness. This could be possible since someone's interest in the pension system might increase as they start having concerns regarding their retirement plans. However, this is not the effect this research tries to examine. The second issue with endogeneity is that there may be third factors that explain the effect (Toshkov, 2016). That would be that the explanatory variable is correlated with the error term, so the effect consists of omitted variable bias. To address to these problems, this research applies an instrumental variable regression with confounding variables. The instrument contains exogenous variation in pension awareness. Instrumenting causes the effect to only run from the instrument, through the treatment variable, to the outcome.

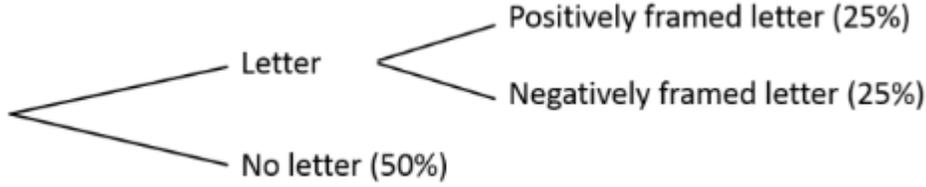
To exclude the possibility of simultaneity, this research uses an instrument that is part of a random experiment. Ten weeks before receiving the PanelWizard pension awareness survey, half of the respondents received a letter from Pensioenlab². The respondents are unaware that the letter is connected to the survey, since they were sent on behalf of different organizations. This letter is used in a field experiment by researchers of Netspar³. Netspar conducts research on the effects of informing Dutch citizens through Facebook and a letter on pension literacy (Knoef et al., 2018). They make use of an experimental research design. Half of the respondents received a letter containing information on the Dutch pension system, which is considered the treatment group. The other half did not receive a letter, and is considered the control group. The letter consists of three parts: an introduction about retirement planning, encouraging the reader to login at www.mijnpensioenoverzicht.nl, and seven facts about the pension system.

Furthermore, in their research Knoef et al. (2018) make use of two differently framed letters. Half of the treatment group received a letter that is positively framed, it contains a positive introduction

² Pensioenlab is an organization that aims to improve the pension awareness of (mostly young) Dutch citizens (Pensioenlab, 2018)

³ Netspar stands for the Network for Studies on Pensions, Aging and Retirement (in the Netherlands).

about retirement planning (Appendix A). The other half received a letter that is negatively framed, it contains a negative introduction about retirement planning (Appendix B). The assignment into treatment and control groups was completely random. The sample was divided into two age groups; the first is the aged 20-40 and the second is aged 41-64. Both groups were equally random assigned into one of the following three groups:



The treatment and control groups can be used as each other's counterfactual in an Instrumental Variable (IV) regression. Angrist & Pischke (2014) describe three conditions, which have to be met in order to have a good instrument. The first condition is the relevance of the instrument; the instrument should influence the treatment. This is measured in the first stage of the regression. The second condition is the independence assumption; the assignment of the instrument should be as good as random. As stated before, the assignment of the sample into treatment and control groups was done completely random. The third condition is the exclusion restriction; the instrument should only affect the outcome via the treatment. Receiving a letter regarding pension information is expected to affect pension concerns only through pension awareness. However, it might be possible that a negative letter raises pension concerns, while not affecting pension awareness. To test for this assumption, a model is added which will be explained later on in this chapter.

As a first step, the following model is estimated by an ordered probit:

$$C_i^* = \gamma PA_i + X_i\beta + U_i \quad (1)$$

Where C_i^* denotes the latent variable for the level of pension concerns of individual i . The level of pension concerns (C) is observed such that

$$C_i = \begin{cases} 1 & \text{if } C_i^* \leq x_1 \\ 2 & \text{if } x_1 < C_i^* \leq x_2 \\ J & \text{if } x_{J-1} < C_i^* \end{cases} \quad (2)$$

The unknown cutoffs satisfy the condition that $x_1 < x_2 < \dots < x_{J-1}$. PA_i denotes the pension awareness of individual i . X_i is a vector of individual characteristics, and U_i is an error term.

However, pension awareness PA_i is likely to be endogenous in which case the ordered probit estimate of γ is inconsistent. As explained before, endogeneity may arise either from omitted variable bias or from simultaneity. In order to overcome potential endogeneity problems, the following IV system of two equations is jointly estimated by maximum likelihood:

$$C_i^* = \gamma PA_i + X_i\beta + U_i \quad (3)$$

$$PA_i^* = \delta Pos_i + \theta Neg_i + X_i\eta + \varepsilon_i \quad (4)$$

Where C_i^* is the latent level of pension concerns (equation 2) and PA_i^* the latent level of pension awareness. PA_i is observed on a scale from one to five, such that a bivariate ordered probit model is estimated. Pos_i denotes a dummy variable for receiving a positively framed letter, and Neg_i denotes a dummy variable for a negatively framed letter.

To make it possible to interpret the results, marginal effects are analyzed. Marginal effects calculates the difference in chance that an individual is in a specific scale for each unit increase in pension awareness. In other words, when the level of pension awareness increases by one unit, the marginal effect calculates to what extent the chance that an individual is in a specific scale of pension concerns is increased or decreased by a specific percentage. This allows comparing the effects of the different components of pension awareness on pension concerns.

This research makes use of fourteen different models. Models 1 until 4 are ordered probit regressions, which are used to show the correlation between pension awareness and pension concerns. Models 5 until 8 are instrumental variable regressions to uncover the causal effects between pension awareness and pension concerns. Models 9 until 12 investigate heterogeneous effects with respect to gender. A dummy variable is added with an interaction effect between the treatment variables and gender. The interaction effect is also added for gender and both the positive and negative letter. The sensitivity analysis consists of models 13 and 14, which are added to control for the possibility that negatively framed letters have an effect on pension concerns, without increasing pension awareness. The different variables are explained in the Data chapter. The analyses are performed with the data analytics program Stata. All the IV regressions are performed with use of the conditional mixed-process (CMP) module (Roodman, 2009).

4. Data

The data are collected from the Dutch PanelWizard pension awareness survey and consist of microdata on Dutch citizens. PanelWizard is an organization that provides an online panel to conduct research. The panel consists of 33.000 members from which a random sample is drawn. PanelWizard uses the Golden Standard for sampling, namely the calibration tool for national and regional samples⁴. Gross samples are standardly sent out on six socio-demographic background variables: gender, age, education, region, family composition and labor force participation (PanelWizard, 2018). To increase reliability and validity of the survey, a control question is asked about the gender and age of the respondent, to check whether the intended respondent matches the actual respondent. After each study, inspections are performed per respondent on the speed of completion, length and content of open answers and "suspicious" response patterns. This results in the removal of inconsistent, unreliable, too fast and non-serious respondents from the net response (PanelWizard, 2018).

The respondents received a survey, which consists of two parts. The first part consist of questions about the respondents' pension behavior. These are questions on the use of the website www.mijnpensionoverzicht.nl, which is a website to see personal pension information. There are also questions asked on the importance the respondents attach to their pension situation. The second part consists of questions to test the pension knowledge of the respondents. This is measured through five questions regarding the current Dutch pension system (Appendix C). In addition to the questions, respondents are asked to what extent they are certain that their answer is correct. This tries to eliminate the possibility that the answer is given correct by chance. It may also provide insight in respondents who either over- or underestimate their knowledge.

4.1 Descriptive statistics

From the 33.000 members of PanelWizard, a gross sample of 7.947 individuals was constructed, with a planned sample size after nonresponse of 4.000 individuals. The actual total sample size after nonresponse was 4.297 individuals from the age of 20 to 64. The descriptive statistics of the sample are shown in table 1.

The sample consists of 4.297 observations, of which 45% is male and 55% is female. Age is measured in seven age groups. The sample is split in two groups to equally divide both the positive

⁴ This is developed by the MOAweb in collaboration with Statistics Netherlands (PanelWizard, 2018)

and the negative framed letter over the treatment and control group. Age group 20-40 consist of 50,6% of the sample, while 49,4% is aged 41-64. The sample is also based on different regions in The Netherlands. 18,6% of the respondents live in the north, 25% in the east, 20,3% live in the south and 36,1% in the west. Furthermore, 21,7% from the respondents lives in a single household, 50% lives together and 29,3% lives in a household with one or more children. Education is measured in three categories, being low, medium and high education. 35,1% of the sample is high educated, 47,8% has medium education and 17,3% has low education. These variables are used as covariates to account for omitted variable bias. This allows to estimate the effect as precise as possible.

Table 1: Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min.	Max.
Pension concerns	4.121	3.288	1.11	1	5
# Correct answers	4.212	2.14	1.04	0	5
Confidence	4.185	1.819	1.61	0	5
Confident and correct	4.185	0.997	1.07	0	5
Login	4.124	0.317	0.47	0	1
Positive letter	4.297	0.254	0.44	0	1
Negative letter	4.297	0.245	0.43	0	1
Female	4.297	0.45	0.5	0	1
High education	4.297	0.351	0.48	0	1
Med education	4.297	0.478	0.5	0	1
Low education	4.297	0.173	0.38	0	1
Single household	4.297	0.217	0.41	0	1
Children household	4.297	0.293	0.46	0	1
North	4.297	0.186	0.39	0	1
East	4.297	0.25	0.43	0	1
South	4.297	0.203	0.4	0	1
West	4.297	0.361	0.48	0	1
Age 20-24	4.297	0.076	0.27	0	1

Age 25-29	4.297	0.121	0.33	0	1
Age 30-34	4.297	0.138	0.35	0	1
Age 35-40	4.297	0.170	0.38	0	1
Age 41-49	4.297	0.212	0.41	0	1
Age 50-59	4.297	0.222	0.42	0	1
Age 60-64	4.297	0.06	0.24	0	1

The dependent variable used in this research measures the concern someone has regarding his or her pension. Respondents were asked to what extent they agreed to the question: “*I am concerned about by pension situation*”. The question could be answered on a five-point Likert scale. A one indicates that this person has very little concerns, and a five that a person has very much concerns regarding his pension situation. The mean of this variable is 3.288, which indicates that on average the sample has medium concerns regarding their pension situation. In figure 1 the percentages can be seen of each level of pension concerns of the sample. Males and females have almost the same percentages in each level of pension concerns.

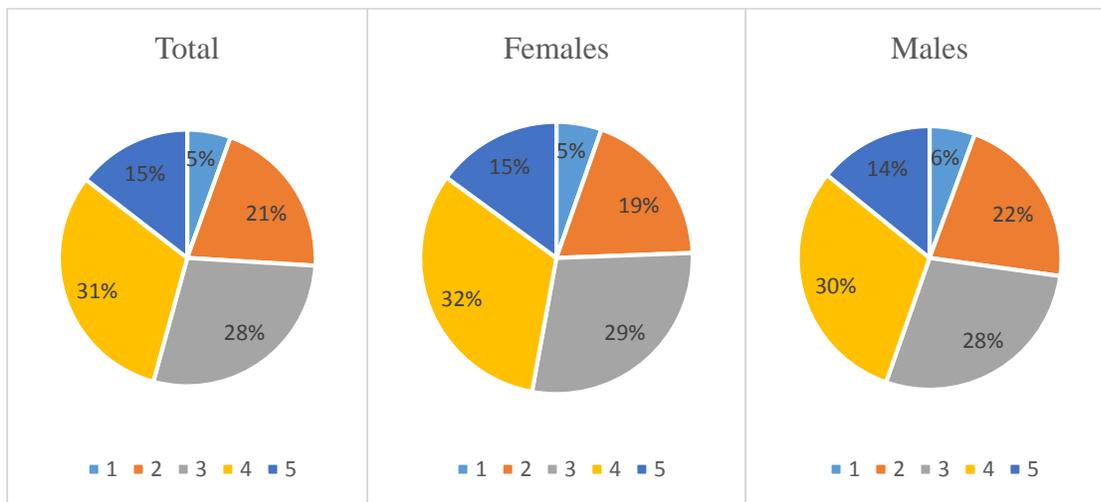


Figure 1: Pension concerns

As explained in the theoretical framework, to measure pension awareness this research uses two components. Pension awareness is measured as pension knowledge and knowledge on the personal pension situation. Pension knowledge is measured through the number of questions answered correctly. However, there is a possibility that the correct answer is given by chance. To exclude

this possibility, this study measures pension knowledge through the number of questions answered correctly and on which someone is confident that it is the right answer. The other component, the knowledge on the personal pension situation is measured in whether a respondent recently logged in to www.mijnpensioenoverzicht.nl.

The first independent variable used in this research to measure pension awareness is the number of questions answered correctly. This variable is constructed by adding up the correct answers to all the questions per respondent. As mentioned in the theoretical framework, this indicates the pension knowledge of each individual. The mean of the sample is 2.14. This shows that the respondents on average answered approximately two out of five questions correctly.

To control for the possibility that a good answer is given by chance, this research uses the variable “Confidence”. This independent variable measures the total amount of confident answers per respondent. Each respondent had to answer to what extent they were confident that they chose the right answer to the question, on a scale from one to five. One indicates very insecure, and five is very confident. The variable confidence is constructed by adding up all the times a respondent had a four or a five on the confidence level. The mean of the sample is 1.819, which indicates that the sample on average answered approximately two out of five questions with confidence.

To control whether the confidence of the respondent was justified, this research uses the variable “Confidence and correct”. This independent variable measures whether a respondent answered a question correctly, and was confident that the answer was correct. Ruling out the possibility that the answer is given correct by chance, this concept measures “true” pension knowledge. This variable is constructed by adding up all correct answers on which the respondent was confident. For each correct answer was checked whether the respondent had either a four or a five as confidence level. The mean of the sample is 0.997, which indicates that on average each respondent answered one out of five questions correctly with confidence.

Figure 2 shows the means of the variables that measure the level of pension knowledge. The figure shows that males and females have about the same pension knowledge (with the possibility that the correct answer is given by chance). However, males are more confident than females, and are more confident and correct as well.

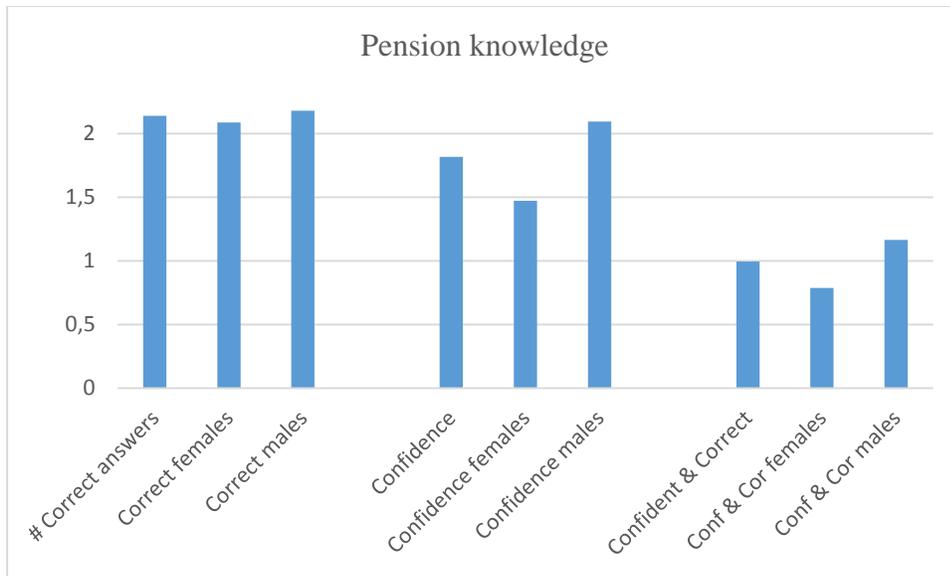


Figure 2: Pension knowledge

Figure 3 shows the association between pension knowledge and pension concerns. The treatment variables seems to have little effect on pension concerns, as the line is nearly constant. However, the variable confident & correct shows a large drop from four and five correct answers on which someone is confident. In general, this figure shows that pension concerns decrease when someone has substantial pension knowledge. Females show that the higher the correct answers or confidence, the more concerns. Except for confident & correct, which drops again. Males show a nearly constant effect, except for confident & correct.

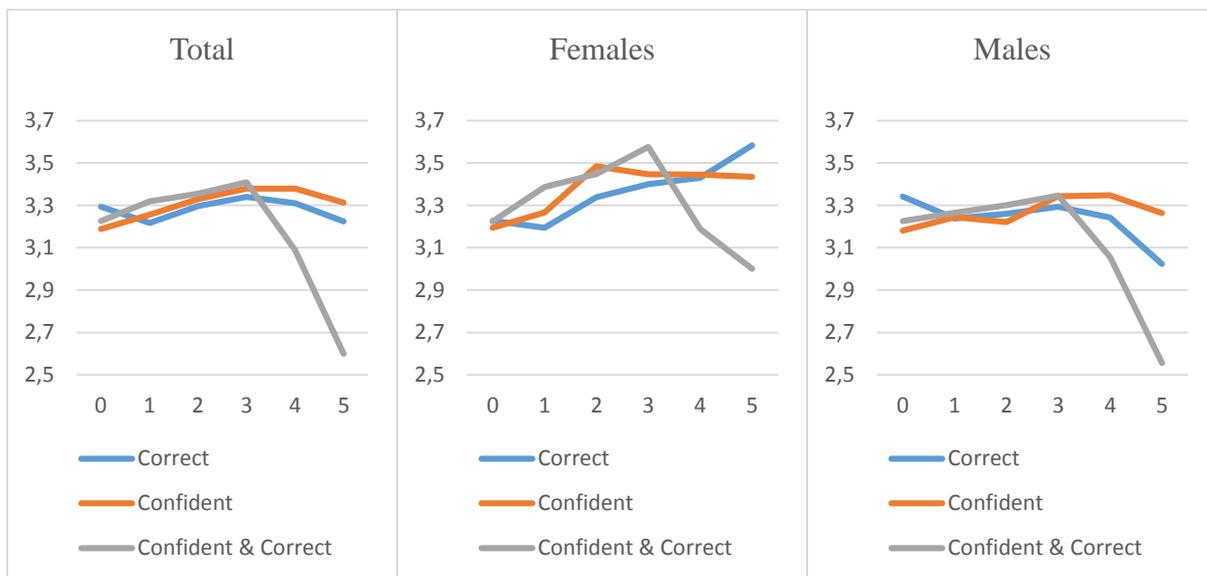


Figure 3: Association between pension knowledge (horizontal axis) and pension concerns (vertical axis)

The final independent variable in this research to measure pension awareness is whether a respondent logged in at www.mijnpensioenoverzicht.nl. This is a dummy indicating whether a person has logged in recently. The mean of the sample is 0.317. This indicates that on average 31,7% recently logged in at the website to check their current pension status. For females this percentage is 25,2%, while 37% of the males has logged in. In general, more men have logged in compared to women. The association between login and pension concerns can be seen in figure 4. The variable login shows an increase in pension concerns when respondents logged in to see their personal pension situation. Login has a positive association with pension concerns, both for men and women.

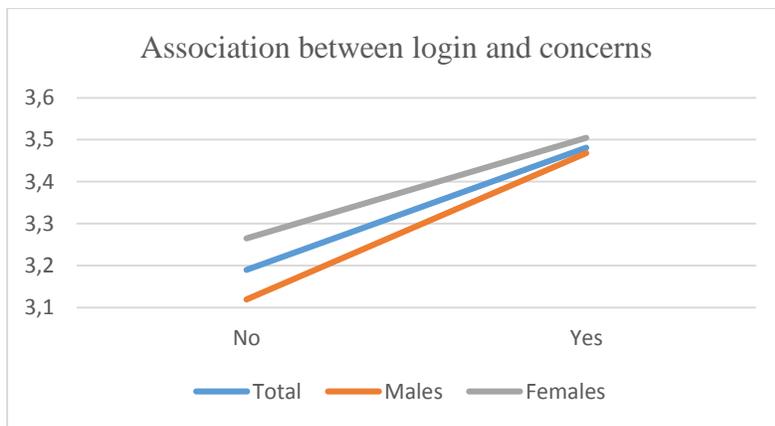


Figure 4: Association between knowledge on the pension situation (measured by logging in, horizontal axis) and pension concerns (vertical axis)

The instrumental variables that are used to expose the exogeneity in this research are the letters containing pension information. As explained in chapter three, the instrument is randomly distributed to individuals in the panel. There are two types of letters, one is positively framed and the other is negatively framed. Both letters are dummy variables in which a one indicates that the respondents received that letter. The means of the variables are 0.254 for the positive letter and 0.245 for the negative letter. This shows that about 25,4% of the respondents received a positive letter, while 24,5% received a negative letter.

5. Results

This chapter shows the estimation results. Table 2 contains the ordered probit estimation results. Table 3 contains coefficients of pension awareness, and in table 4 are the coefficients of pension concerns. In table 5 the marginal effects are presented, and table 6 consists of the estimation results of the heterogeneous effects. First, the results are discussed alongside with a sensitivity analysis, which is presented in table 7. Second is analyzed to what extent the hypotheses can be confirmed or rejected.

5.1 Correlation between pension awareness and pension concerns

Table 2 presents the results from the ordered probit regressions, which show the correlation between the dependent and independent variables. There is a positive significant relation between the confidence of the respondent and the pension concerns. The same goes for the relation between login and pension concerns. The other independent variables give no significant result. However, as explained in the method, this correlation might consist of simultaneity. The positive correlation between pension awareness and pension concerns may be explained by the fact that especially those individuals who have concerns may have a look at their pension and the pension system.

Table 2: Ordered probit estimation results⁵

	Model 1	Model 2	Model 3	Model 4
Dependent variable	Concerns	Concerns	Concerns	Concerns
# Correct answers	.011 (0.02)			
Confidence		.033*** (0.01)		
Confident & Correct			.021 (0.02)	
Login				.270*** (0.04)
	N=4.121	N=4.121	N=4.121	N=3.981
Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01				

5.2 Effect of pension awareness on pension concerns

Tables 3 and 4 show the estimation results of the two jointly estimated regressions by maximum likelihood. In order for a model to have meaningful results, the instrument should be relevant. The coefficients of pension awareness show the effect of the instruments and control variables on different treatment variables. Coefficients for pension concerns show the effect of the treatment and control variables on the dependent variable pension concerns.

⁵ Table 2 consist of the same control variables as table 3 & 4.

Table 3: Coefficients of pension awareness

Dependent variable	Model 5		Model 6		Model 7		Model 8	
	# Correct answers		Confidence		Confident & correct		Login	
Positive letter	.034	(0.04)	.055	(0.04)	.075*	(0.04)	.074**	(0.04)
Negative letter	.096**	(0.04)	.031	(0.04)	.080**	(0.04)	.060	(0.04)
Female	-.043	(0.03)	-.374***	(0.03)	-.335***	(0.04)	-.278***	(0.04)
Single hh	.011	(0.04)	-.029	(0.04)	-.001	(0.04)	-.123**	(0.05)
Children	-.001	(0.04)	-.019	(0.04)	-.016	(0.04)	-.058	(0.05)
High edu	.199***	(0.04)	.200***	(0.04)	.313***	(0.04)	.152***	(0.05)
Low edu	-.125***	(0.05)	-.148***	(0.05)	-.188***	(0.04)	-.019	(0.06)
North	-.095**	(0.05)	-.066	(0.05)	-.133***	(0.04)	-.148**	(0.06)
East	-.080*	(0.04)	.009	(0.04)	-.039	(0.05)	-.061	(0.05)
South	-.066	(0.04)	-.092**	(0.05)	-.087*	(0.05)	-.042	(0.06)
Age 25-29	.100	(0.08)	.175**	(0.08)	.198**	(0.04)	.440***	(0.10)
Age 30-34	.179**	(0.07)	.248***	(0.08)	.309***	(0.05)	.454***	(0.10)
Age 35-40	.317***	(0.07)	.365***	(0.08)	.449***	(0.09)	.383***	(0.10)
Age 41-49	.369***	(0.07)	.506***	(0.07)	.669***	(0.08)	.426***	(0.10)
Age 50-59	.497***	(0.07)	.675***	(0.07)	.796***	(0.08)	.602***	(0.09)
Age 60-64	.554***	(0.09)	.797***	(0.09)	.985***	(0.08)	.906***	(0.12)
Constant							-.816***	(0.09)
	N=4.212		N=4.185		N=4.185		N=4.124	

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

Table 4: Coefficients of pension concerns

Dependent variable	Model 5		Model 6		Model 7		Model 8	
	Concerns		Concerns		Concerns		Concerns	
# Correct answers	.023	(0.22)						
Confidence			-.070	(0.08)				
Confident & Correct					-.207**	(0.09)		
Login							-.960***	(0.10)
Female	.073**	(0.03)	.033	(0.06)	.007	(0.04)	-.030	(0.04)
Single hh	-.002	(0.04)	-.004	(0.04)	.001	(0.04)	-.043	(0.04)
Children	.000	(0.04)	-.004	(0.04)	-.002	(0.04)	-.019	(0.04)
High edu	-.107*	(0.06)	-.081*	(0.04)	-.038	(0.05)	-.029	(0.04)
Low edu	.025	(0.05)	.009	(0.05)	-.010	(0.05)	.020	(0.05)
North	-.094*	(0.05)	-.102**	(0.05)	-.117**	(0.05)	-.136***	(0.05)
East	-.091**	(0.05)	-.091**	(0.04)	-.097**	(0.04)	-.099**	(0.04)
South	.036	(0.05)	.024	(0.05)	.018	(0.05)	.020	(0.05)
Age 25-29	.447***	(0.08)	.460***	(0.08)	.464***	(0.08)	.485***	(0.08)
Age 30-34	.430***	(0.08)	.452***	(0.08)	.467***	(0.08)	.488***	(0.08)
Age 35-40	.575***	(0.10)	.611***	(0.08)	.639***	(0.08)	.581***	(0.07)
Age 41-49	.610***	(0.11)	.662***	(0.08)	.717***	(0.08)	.631***	(0.07)
Age 50-59	.653***	(0.13)	.724***	(0.09)	.786***	(0.08)	.732***	(0.07)
Age 60-64	.724***	(0.15)	.810***	(0.12)	.898***	(0.11)	.923***	(0.09)
	N=4.212		N=4.185		N=4.185		N=4.124	

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

Model 5 shows that there is a significant effect from the negative letter on the number of correct answers (the instrument appears to be relevant). However, the number of correct answers does not have a significant effect on pension concerns. In model 6 the instruments are not relevant, such that the estimate of confidence on pension concerns may be biased.

Model 7 shows the effect of true pension knowledge on pension concerns. Both the positive and the negative letter have a positive significant effect on the number of questions answered correctly with confidence. This is in line with the expectation that the informative letter would raise pension knowledge of respondents. The treatment variable has a negative significant effect on pension concerns. When a respondent answers one additional question correctly with confidence, the level of pension concerns decreases. This is in line with the literature of Lusardi & Mitchell (2011c) and Taft et al. (2013). Although model 3 shows no significant correlation, the causal relationship is negative. This can be explained by the fact that there are unobserved characteristics in the sample. In the sample, there may be for example pessimists and optimists, which together will not result in a significant effect. Individual A with adequate pension accrual and low concerns gets compared with individual B with inadequate pension accrual and high concerns. Their levels of pension concerns cancel each other out, so there is no significant outcome. However, by randomly sending exogenous letters to raise pension awareness, the individuals with high and low pension awareness are compared. This results in a significant negative causal effect.

Model 8 shows the effect of knowledge on the personal pension situation on pension concerns. The positive letter shows to have a positive significant result on whether a respondent logged in to check his personal pension situation. The treatment variable has a significant negative effect on pension concerns. This indicates that when someone logged in to check his personal pension situation, pension concerns decrease. This is in line with the literature of Lusardi & Mitchell (2011c) and Taft et al. (2013). Although model 4 shows a positive correlation between login and pension concerns, the causal relation is negative (model 8). The different signs may be explained by the possibility that especially those who have concerns are logging in at www.mijnpensioenoverzicht.nl. In the sample, pension concerns are positively associated with logging in. However, when someone received a positive letter containing pension information, the concerns decrease.

Control variables are added to control for possible confounders. Without control variables, the coefficients would have been insignificant. On average, the effects of the control variables are the same among the different models. Table 3 shows that males and females have on average the same pension knowledge (model 5), assuming that the gambling chance is equal. Males show to be more confident than females, and males are as well more often correct and confident. This is in line with the results from the descriptive statistics. Furthermore, high-educated people have a significant higher pension awareness, compared to medium and low educated people. In addition, older people have a significant higher pension awareness compared to younger people. Table 4 shows that people living in the north and the east have significant less pension concerns compared to people from the west. Furthermore, the pension concerns significantly increase when the respondents get older.

5.3 Marginal effects of pension awareness on pension concerns

Table 5 shows the marginal effects of pension awareness on pension concerns.

	Model 5		Model 6		Model 7		Model 8	
Dependent variable	# Correct answers		Confidence		Confident & correct		Login	
Pension concern 1	-.0025	(0.024)	.0079	(0.009)	.0245**	(0.012)	.1547***	(0.025)
Pension concern 2	-.0048	(0.046)	.0144	(0.016)	.0409**	(0.016)	.1500***	(0.007)
Pension concern 3	-.0017	(0.016)	.0048	(0.005)	.0134**	(0.005)	.0402***	(0.003)
Pension concern 4	.0038	(0.036)	-.0112	(0.012)	-.0310**	(0.011)	-.0912***	(0.005)
Pension concern 5	.0052	(0.050)	-.0159	(0.018)	-.0478**	(0.022)	-.2533***	(0.033)
	N=4.212		N=4.185		N=4.185		N=4.124	
Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01								

The marginal effects of model 5 and 6 show no significant results. Results from model 7 show that when someone has one additional correct answer on which he is confident, there is an increased chance of 2.45 percentage points to have pension concern level one. And there is a decreased chance of 4.78 percentage points of having pension concern level five. Model 8 consists of the marginal effects of Login, which are in accordance with model 7. This shows that when someone logged in, the chance that he has level five pension concern decreases with 25.33 percentage points. The chance of having level one pension concern increases with 15.47 percentage points after logging in. These results show that the effect of logging in is stronger than the effect of correct and confident answers.

5.4 Heterogeneous effect

Table 6 shows the models 9 to 12, which consist of the estimation results of the heterogeneous effects with respect to gender. The models are estimated for men and women separately as well. However, these results are not presented as the instrument frequently turns out to be insignificant.

	Model 9	Model 10	Model 11	Model 12
Dependent variable	Concerns	Concerns	Concerns	Concerns
# Correct answers	.016 (0.22)			
Correct female	.081** (0.03)			
Confidence		-.077 (0.08)		
Confidence female		.032 (0.02)		
Confident & Correct			-.181** (0.09)	
Conf&cor female			.065** (0.03)	
Login				-.928*** (0.10)
Login female				-.114** (0.06)
	N=4.212	N=4.185	N=4.185	N=4.124
Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01				

If the interaction term is assumed exogenous, the results are as follows. As can be seen in the table, the effect of the number of correct answers is not significantly different from zero. However, the effect is stronger for women than for men. The effect of confidence remains insignificant. The effect of the number of corrects answers on which someone is confident is significantly less strong for women than for men. So, increasing pension literacy is less effective to decrease the concerns of women, compared to men. This is in line with the literature of Lusardi & Mitchell (2008). However, for the other treatment variable Login, the effect is the other way around. The effect of logging in is significantly stronger in reducing pension concerns for females than for males. This is not in line with the literature of Chen & Volpe (2002) and Lusardi & Mitchell (2008). However, as Bucher-Koenen et al (2017) explain, financial education can be more successful for women than men.

5.5 Sensitivity analysis

Table 7 shows the results of the robustness analyses. As stated in the method, pension concerns might increase because of the negatively framed letter, without raising pension awareness. To control for this, in model 13 and 14 the negative letter is added to the coefficients of pension

⁶ Table 6 consist of the same control variables as table 3 & 4.

concerns, such that only the positive letter remains as an instrumental variable. The results of the sensitivity analysis show that negative letter has no significant effect on the level of pension concerns. Thus, a negatively framed letter does not increase pension concerns.

Table 7: Sensitivity estimation results⁷

	Model 13		Model 14	
Dependent variable	Concerns		Concerns	
Confident & Correct	-.206***	(0.09)		
Login			-.969***	(0.10)
Negative letter	-.011	(0.04)	-.007	(0.03)
	N=4.185		N=	
Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01				

5.6 Analysis of the hypotheses

Based on the estimation results, the expectations of the hypotheses can be confirmed or rejected. In the first hypothesis, the expectation is that there is a negative relation between pension knowledge and pension concerns. The results of model 3 show an insignificant correlation. However, the results of model 7 show that there is a negative causal relation between pension knowledge and pension concerns. The different signs may be explained by the possibility that there are unobserved characteristics in the sample. By randomly sending exogenous letters to raise pension awareness, the individuals with high and low pension awareness are compared. Model 5 includes the possibility that the correct answer is given by chance. However, model 7 rules out that possibility by adding the confidence on the correctness of the answers. Therefore, the hypothesis can be confirmed with 95% confidence. Respondents that answered more questions correctly with confidence have significantly less pension concerns. Furthermore, the sensitivity analysis shows that negative letters have no significant effect on pension concerns.

In the second hypothesis, the expectation is that there is a negative relation between knowledge on the personal pension situation and pension concerns. The results from model 4 show a significant positive correlation. However, the results from model 8 show that there is a strong and significant negative causal relation. The different signs may be explained by the possibility that especially those in the sample who have concerns are logging in. However, when someone received a positive letter containing pension information, the concerns decrease. Therefore, the hypothesis can be

⁷ Table 5 consist of the same control variables as table 3 & 4. Both models have an insignificant instrument (positive letter).

confirmed with 99% confidence. People who logged in to see their personal pension situation have less pension concerns compared to people who did not log in. Furthermore, the sensitivity analysis shows that negative letters have no significant effect on pension concerns.

The third hypothesis focused on the heterogeneous effect with regard to gender. The expectancy is that the effects of pension awareness on pension concerns are larger for men compared to women. In other words, women experience more pension concerns than men do. The results from table 6 show that women who are correct and confident about their answers have more pension concerns than men. However, women who logged in to see their pension situation have less pension concerns compared to men who did. So on the one hand, pension knowledge leads to less pension concerns for men than for women. On the other hand, knowledge on the personal pension situation results in less pension concerns for women compared to men. The hypothesis cannot be completely accepted. These findings can be confirmed with 95% confidence.

6. Conclusion, discussion and recommendations

This chapter consists of three parts. First the conclusions are drawn. Here the research question is answered, based on the analysis of the hypotheses. Second, the conclusions are discussed alongside with the shortcomings of the research. Third, there are several policy implications and recommendations for future research.

6.1 Conclusion

This research examines the causal relationship between pension awareness and pension concerns. The first expectation is that there is a negative relation between pension knowledge and pension concerns. In other words, when one's pension knowledge increases, the pension concerns decrease. The results show that there is indeed a negative relation between these two variables. The model shows a significant negative causal effect of the number of correct answers on which someone is confident on pension concerns. So for each correct answer on which the respondent also was confident that it was correct, pension concerns decrease.

The second expectation is that there is a negative relation between knowledge on the personal pension situation and pension concerns. So when someone is up to date on his personal pension situation because of logging in to www.mijnpensioenoverzicht.nl, the pension concerns decrease. The results show that there is a strong and significant negative causal effect. People who logged in to see their personal pension situation have less pension concerns compared to people who did not log in.

The third expectation is that the effects of pension awareness on pension concerns are larger for men compared to women. In other words, the effects are less strong for women than for men. The results show that for pension knowledge the effect is stronger for men than for women. However, the effect for knowledge on the personal pension situation on pension concerns is stronger for women than for men.

Given the results to the expectations, conclusions can be drawn to the research question *“To what extent does pension awareness effect pension concerns?”* On the one hand, pension knowledge of which someone is confident decreases concerns regarding the pension situation. On the other hand, knowledge on the personal pension situation significantly decreases the pension concerns. Furthermore, the effects seem to differ with respect to gender. This has several implications. True pension knowledge can be useful to reduce pension concerns. Knowledge about the personal

pension situation reduces concerns as well. This implies that pension awareness, in the form of pension knowledge and insight in the personal pension situation, reduces pension concerns.

These results add to existing literature on financial literacy and specifically pension literacy. Based on this research it can be concluded that pension awareness reduces pension concerns. These conclusions are in accordance with the literature reviewed in the theoretical framework. In addition, this research provides evidence of a causal effect of pension awareness on pension concerns, which is a contribution to current literature. However, the heterogeneous effects with regard to gender do not fully correspond with the literature. Furthermore, the conclusions have several implications for society. This research proves that pension awareness decreases pension concerns. If society wants to increase their trust in their pension plan, they might consider increasing their pension literacy. This research only makes use of a simple letter, framed either positively or negatively. Both letters seemed to have a significant effect. So increasing ones pension literacy can be a relatively easy task. The government and pension funds might consider these conclusions in the upcoming pension reforms.

6.2 Discussion

To begin with, this research has methodological shortcomings. The use of quantitative data analysis has some disadvantages. Surveys may elicit social desirable answers. Even when the survey is anonymous and online, individuals might respond in a certain way that is not completely honest, which could bias the outcome. However, the respondents were not aware that the survey was linked to the letter they received. Both the survey and the letter were sent on behalf of different organizations. Another disadvantage is that someone could misinterpret the questions of the survey. The answer to a question could mean something different to the respondent. Interviews could give a better possibility to reveal the true intention of an answer. However, it is practically impossible to perform this type of research with the given timeframe. Nevertheless, a small amount of interviews may have strengthened the outcome.

The bias of the researcher is partly taken away by performing quantitative research. However, the bias plays still an important role, since there has been chosen to measure concepts in a certain way, given the available variables in the dataset. For instance, the concept pension literacy can be measured in numerous ways. Each way with different variables may result in different outcomes. However, this bias can never be taken out completely.

Another disadvantage is the relatively small sample size. The sample is large enough to find statistically significant effects. However, when the sample is split into two groups to analyze heterogeneous effects with regard to gender, the results will turn insignificant. Because the letter is sent to half of the respondents (the treatment group), the sample gets too small to find significant effects. Especially because the treatment group is split in two as well, to distribute the positive and negative letter. An interaction effect between the instruments and females contains too few observations to find a significant effect. That is why the interaction term is assumed exogenous, which goes at the expense of the validity of the results.

Furthermore, the way the concept pension concerns is measured is possibly too narrow. Pension concerns is measured by one question, the extent to which a respondent agrees that he has concerns regarding his pension situation. Other studies like Taft et al. (2013) use several questions to measure this concept. It is possible that respondents have multiple views on how to interpret this question. It remains unclear what causes the (lack of) concerns of the respondents. For example, a respondent could be concerned about his personal inadequate pension accrual. Or it could be that the concerns arose because of low trust in the pension system. Multiple questions, as Taft et al. (2013) applied, may have strengthened the outcome.

Finally, this research uses a sample that is from The Netherlands. That is why it is hard to generalize the conclusions to other countries. Other countries have different cultures and institutions, which may affect the outcomes in a different way.

6.3 Recommendations

Based on the outcomes of the research, several recommendations can be given. On the one hand, recommendations can be given for policy implications. The conclusion of this research shows that pension awareness reduces pension concerns. As mentioned in the conclusion, the government can consider these outcomes when reforming the pension system. This research shows that pension literacy matters when it comes to pension concerns. If the pension system is reformed to a less complicated system, more people will be able to understand it. If society becomes more financially literate, they can become more self-reliant when it comes to adequate pension accrual. In addition, they will be less dependent on government expenditures. Furthermore, increasing the pension literacy of society may possibly increase the trust in pension funds. Increasing pension literacy can be done relatively easy by sending a letter, which can be either positively or negatively framed.

This will persuade people to increase their pension knowledge and knowledge on the personal pension situation, which results in less pension concerns.

On the other hand, several recommendations for future research can be given. The conclusions from this research have several shortcomings and therefore it is recommended to perform more research on this topic. First, it is recommended to perform a research that has both quantitative and qualitative aspects. This may help to better interpret the results. Second, more research should be done including data from other countries. Since this research uses data from The Netherlands, it is hard to generalize the outcomes to other countries. Third, the concept pension awareness could be measured in a different way, or on different dependent variables. The same goes for pension concerns, multiple questions on pension concerns of respondents may provide a better interpretation. Finally, additional research could be done on what method would be most effective and efficient in educating society about financial or pension literacy.

Reference list

- Agnew, J.R., Anderson, L.R., Gerlach, J.R., Szykman, L.R. (2008). Why choose annuities? An experimental investigation of the role of gender, framing, and defaults, *The American Economic Review* 98(2): 418-422.
- Agnew, J.R., Bateman, H., Thorp, S. (2013). Financial literacy and retirement planning in Australia, *Numeracy* 6(2): 1-25.
- Alessie, R., Van Rooij, M., Lusardi, A. (2011). Financial literacy and retirement preparation in the Netherlands, *Journal of Pension Economics and Finance* 10(4): 527-545.
- Almenberg, J., Säve-Söderbergh, J. (2011). Financial literacy and retirement planning in Sweden, *Journal of Pension Economics and Finance* 10(4): 585-598.
- Angrist, J. D., & Pischke, J. S. (2014). *Mastering'metrics: The path from cause to effect*. Princeton University Press.
- Arrondel, L., Debbich, M., Savignac, F. (2013). Financial literacy and financial planning in France, *Numeracy* 6(2): 1-17.
- Bateman, H., Stevens, R., Lai, A. (2015). Risk information and retirement investment choice mistakes under prospect theory, *Journal of Behavioral Finance* 16(4): 279-296.
- Beckmann, E. (2013). Financial literacy and household savings in Romania, *Numeracy* 6(2): 1-22.
- Bernheim, D. D. (1998). *Financial illiteracy, education, and retirement saving* (No. 96-7). Wharton School Pension Research Council, University of Pennsylvania.
- Boisclair, D., Lusardi, A., Michaud, P.-C. (2015). Financial literacy and retirement planning in Canada, *Journal of Pension Economics and Finance* 16(3): 277-296.
- Brown, M., Graf, R. (2013). Financial literacy and retirement planning in Switzerland, *Numeracy* 6(2): 1-21.
- Browning, M., & Crossley, T. F. (2001). The life-cycle model of consumption and saving. *Journal of Economic Perspectives*, 15(3), 3-22.
- Bücher-Koenen, T., Lusardi, A. (2011). Financial literacy and retirement planning in Germany, *Journal of Pension Economics and Finance* 10(4): 565-584.

Bucher-Koenen, T., Lusardi, A., Alessie, R., & Van Rooij, M. (2017). How financially literate are women? An overview and new insights. *Journal of Consumer Affairs*, 51(2), 255-283.

Chan, S., Stevens, A.H. (2008). What you don't know can't help you: Pension knowledge and retirement decisions-making, *The Review of Economics and Statistics* 90(2): 253-266.

Chen, H., & Volpe, R. P. (2002). Gender differences in personal financial literacy among college students. *Financial services review*, 11(3), 289.

Clark, R. L., d'Ambrosio, M. B., McDermed, A. A., & Sawant, K. (2006). Retirement plans and saving decisions: the role of information and education. *Journal of Pension Economics & Finance*, 5(1), 45-67.

Crossan, D., Feslier, D., Hurnard, R. (2011). Financial literacy and retirement planning in New Zealand, *Journal of Pension Economics and Finance* 10(4): 619-635.

Eberhardt, W., Brüggem, E., Post, T., & Hoet, C. (2017). Activating pension plan participants: investment and assurance frames. *Netspar Design Paper*, 72.

Fernandes, D., Lynch Jr, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science*, 60(8), 1861-1883.

Fornero, E., Monticone, C. (2011). Financial literacy and pension plan participation in Italy, *Journal of Pension Economics and Finance* 10(4): 547-564.

Hastings, J., Mitchell, O. S., & Chyn, E. (2011). Fees, framing, and financial literacy in the choice of pension managers. *Financial literacy: Implications for retirement security and the financial marketplace*, 101.

Kahneman, D. (1979). Prospect theory: An analysis of decisions under risk. *Econometrica*, 47, 278.

Knoef, M., Been, J., Alessie, R., Caminada, K., Goudswaard, K., & Kalwij, A. (2016). Measuring retirement savings adequacy: developing a multi-pillar approach in the Netherlands. *Journal of Pension Economics & Finance*, 15(1), 55-89.

Knoef, M. G., Been, J., & Van Putten, M. (2018). Raising pension awareness through letters and social media: What works for whom? Evidence from a randomized and quasi-experiment. *Presented at Netspar, March 13th 2018*

- Knoef, M. G., Caminada, C. L. J., Been, J., & Goudswaard, K. P. (2017). De toereikendheid van pensioenopbouw na de crisis en pensioenhervormingen. *Netspar Industry Paper Series: Design Paper*.
- Klapper, L., Panos, G.A. (2011). Financial literacy and retirement planning: The Russian case, *Journal of Pension Economics and Finance* 10(4): 599-618.
- Luchak, A. A., & Gunderson, M. (2000). What do employees know about their pension plan?. *Industrial Relations: A journal of economy and society*, 39(4), 646-670.
- Lusardi, A. (2003). *Planning and saving for retirement* (p. 2). Working paper. Dartmouth College.
- Lusardi, A., Michaud, P.-C., Mitchell, O.S. (2017). Optimal financial knowledge and wealth inequality, *The Journal of Political Economy* 125(2): 431-477.
- Lusardi, A., & Mitchell, O. S. (2007). Financial literacy and retirement preparedness: Evidence and implications for financial education. *Business economics*, 42(1), 35-44.
- Lusardi, A., & Mitchell, O. S. (2008). Planning and financial literacy: How do women fare?. *American Economic Review*, 98(2), 413-17.
- Lusardi, A., & Mitchell, O. S. (2011a). Financial literacy around the world: an overview. *Journal of Pension Economics & Finance*, 10(4), 497-508.
- Lusardi, A., Mitchell, O.S. (2011b). Financial literacy and retirement planning in the United States, *Journal of Pension Economics and Finance* 10(4): 509-525.
- Lusardi, A., & Mitchell, O. S. (2011c). *Financial literacy and planning: Implications for retirement wellbeing* (No. w17078). National Bureau of Economic Research.
- Lusardi, A., Mitchell, O.S. (2014). The economic importance of financial literacy: Theory and evidence, *Journal of Economic Literature* 52(1): 5-44.
- Mercer (2017). Vertrouwen deelnemers in pensioenfondsen. Accessed at May 20th 2018, via <https://www.mercer.nl/onze-deskundigheid/vertrouwen-deelnemers-in-pensioenfondsen.html>
- Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. *Franco Modigliani*, 1, 388-436.

PanelWizard (2018). 'Het PanelWizard panel'. Accessed at April 17th 2018, via <https://www.panelwizard.com/over-ons-panel>

Pensioenfederatie (2016). 'Pensioen kennis en vertrouwen gaan hand in hand'. Accessed at May 20th 2018, via <https://www.pensioenfederatie.nl/stream/deelnemersonderzoekrapportagepensioenfederatie.pdf>

Pensioenlab (2018). 'Over het pensioenlab'. Accessed at April 17th 2018, via <http://www.pensioenlab.nl/over-ons/>

Raalte, J. van, & Kars, J. (2018). 'Pensioen? Ik kies er bewust voor mijn kop in het zand te steken'. *De Volkskrant*. Accessed at June 6th 2018, via <https://www.volkskrant.nl/nieuws-achtergrond/-pensioen-ik-kies-er-bewust-voor-mijn-kop-in-het-zand-te-steken-~b677c335/>

Remund, D. L. (2010). Financial literacy explicated: The case for a clearer definition in an increasingly complex economy. *Journal of consumer affairs*, 44(2), 276-295.

Roodman, D. (2009). Estimating fully observed recursive mixed-process models with cmp.

Sekita, S. (2011). Financial literacy and retirement planning in Japan, *Journal of Pension Economics and Finance* 10(4): 637-656.

Taft, M. K., Hosein, Z. Z., & Mehrizi, S. M. T. (2013). The relation between financial literacy, financial wellbeing and financial concerns. *International Journal of Business and Management*, 8(11), 63.

Toshkov, D. (2016). *Research design in political science*. Palgrave Macmillan.

Van Rooij, M. C., Lusardi, A., & Alessie, R. J. (2011). Financial literacy and retirement planning in the Netherlands. *Journal of Economic Psychology*, 32(4), 593-608.

Van Rooij, M.C.J., Lusardi, A., Alessie, R.J.M. (2012). Financial literacy, retirement planning, and household wealth, *The Economic Journal* 122(560): 449-478

Appendix A: Positively framed letter

Wat kun je doen?

Stel je voor: Na jaren werken is het zover, je mag met pensioen. Er is ineens tijd voor die wereldreis, die leuke hobby waar je nooit tijd voor had, of toch de geraniums verplanten? Hoe je het ook wendt of keert, dit kost allemaal geld. Misschien wel meer geld dan de uitkering die je krijgt vanuit de AOW en je aanvullende pensioen.

Ben jij benieuwd hoeveel je nu al gespaard hebt? En wat voor leuke dingen je daar later mee kan doen? Kijk dan op www.mijnpensioenoverzicht.nl nadat je de belastingaangifte hebt gedaan dit jaar, want dan heb je jouw DigiD toch al bij de hand! Zo doe je dat:

- 1) *Je doet je belastingaangifte*
- 2) *Dan klik je door naar www.mijnpensioenoverzicht.nl*
- 3) *Log in met je DigiD (die je toch al bij de hand hebt voor de belastingaangifte)*
- 4) *Geef jezelf inzicht in je inkomen voor later*

Waarom zou ik dit doen?

Pensioen heeft niet alleen te maken met “later”, maar ook met nu. Pensioenpremies betalen, een huis kopen, trouwen, scheiden, kinderen krijgen, een jaar er tussenuit of eerder stoppen met werken. Dit heeft allemaal te maken met je financiële planning en je pensioen.

Wist je dat:

- + 20% van je loon naar je pensioen gaat? Dat is gelijk aan 1 dag werken per week.
- ✗ De AOW premie die je nu betaalt volledig gebruikt wordt om de AOW uitkeringen van de huidige ouderen te betalen?
- ✗ De meeste werknemers bouwen verplicht een werknemerspensioen op, bovenop de AOW.
- ✗ Werknemers en werkgevers meestal allebei premies betalen voor het werknemerspensioen? Deze premies worden belegd en daar wordt later de pensioenuitkering van betaald.
- + Als een pensioenfonds er slecht voor staat moeten pensioenen verlaagd worden. Dit raakt niet alleen gepensioneerden, maar ook de pensioenopbouw van werknemers.
- ✗ Een pensioenfonds uitkeringen alleen aanpast aan stijgende prijzen wanneer de financiële positie van het fonds goed genoeg is? Dit wordt *indexatie* genoemd.
- + Iemand die 20 uur per week werkt de helft minder werknemerspensioen opbouwt dan zijn/haar collega die 40 uur per week werkt?

Maak jij je zorgen?

In de media lezen we sombere berichten over het pensioenstelsel. "De AOW wordt onbetaalbaar", "Pensioenfondsen bereiden deelnemers voor op verlaging pensioen" en "Kabinet waarschuwt voor lager pensioen". Het is geen wonder dat 8 op de 10 Nederlanders onzeker is over hun inkomen voor later of denken dat ze te weinig pensioen opbouwen.

Heb jij je pensioen eigenlijk wel goed geregeld? Wil je zeker weten dat je genoeg inkomen hebt als je later met pensioen gaat? Kijk dan op www.mijnpensioenoverzicht.nl nadat je de belastingaangifte hebt gedaan dit jaar, want dan heb je jouw DigiD toch al bij de hand! Zo doe je dat:

- 1) *Je doet je belastingaangifte*
- 2) *Dan klik je door naar www.mijnpensioenoverzicht.nl*
- 3) *Log in met je DigiD (die je toch al bij de hand hebt voor de belastingaangifte)*
- 4) *Geef jezelf inzicht in je inkomen voor later*

Waarom zou ik dit doen?

Pensioen heeft niet alleen te maken met "later", maar ook met nu. Pensioenpremies betalen, een huis kopen, trouwen, scheiden, kinderen krijgen, een jaar er tussenuit of eerder stoppen met werken. Dit heeft allemaal te maken met je financiële planning en je pensioen.

Wist je dat:

- + 20% van je loon naar je pensioen gaat? Dat is gelijk aan 1 dag werken per week.
- ✗ De AOW premie die je nu betaalt volledig gebruikt wordt om de AOW uitkeringen van de huidige ouderen te betalen?
- ✗ De meeste werknemers bouwen verplicht een werknemerspensioen op, bovenop de AOW.
- ✗ Werknemers en werkgevers meestal allebei premies betalen voor het werknemerspensioen? Deze premies worden belegd en daar wordt later de pensioenuitkering van betaald.
- + Als een pensioenfonds er slecht voor staat moeten pensioenen verlaagd worden. Dit raakt niet alleen gepensioneerden, maar ook de pensioenopbouw van werknemers.
- + Een pensioenfonds uitkeringen alleen aanpast aan stijgende prijzen wanneer de financiële positie van het fonds goed genoeg is? Dit wordt *indexatie* genoemd.
- + Iemand die 20 uur per week werkt de helft minder werknemerspensioen opbouwt dan zijn/haar collega die 40 uur per week werkt?

Appendix C: Knowledge questions on the pension system

Nu volgen er 5 vragen over het Nederlandse pensioenstelsel. Geef steeds aan wat volgens u het goede antwoord is. Als u het antwoord niet weet, kies dan het antwoord dat u het meest logisch lijkt. Na afloop zullen we u vragen hoe zeker u over uw antwoord bent.

1. Wat gebeurt er met de betaalde AOW premies?

- Die worden belegd, zodat ik na pensionering een uitkering kan krijgen
- Die worden gebruikt om de AOW uitkeringen van de huidige ouderen te betalen
- Die worden deels belegd en deels gebruikt om de AOW uitkeringen van de huidige ouderen te betalen

(1 antwoord mogelijk vraag)

2. Wie betaalt/betalen pensioenpremies voor werknemerspensioen?

- Meestal alleen de werknemer
- Meestal alleen de werkgever
- Meestal zowel de werknemer als de werkgever

(1 antwoord mogelijk vraag)

3. Als een pensioenfonds er slecht voor staat, moeten pensioenen verlaagd worden. Welke deelnemers worden geraakt als een pensioenfonds moet korten?

- Gepensioneerden
- Actieve werknemers
- Alle (oud-)werknemers en gepensioneerden

(1 antwoord mogelijk vraag)

4. Hoeveel procent van het loon wordt er gemiddeld betaald aan pensioenpremies (door alle betrokken partijen)?

- 10%
- 15%
- 20%
- 30%

(1 antwoord mogelijk vraag)

5. Lisa en Femke zijn collega's. Ze hebben hetzelfde uurloon en ze bouwen allebei pensioen op. Lisa werkt 20 uur per week en Femke 40 uur per week. Hoe hoog zal het werknemerspensioen van Lisa zijn?

- De helft van het pensioen van Femke
- Veel minder dan de helft dan het pensioen van Femke
- Dat hangt van de pensioenregeling af

(1 antwoord mogelijk vraag)