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The effect of personal endowments, background information and character traits on risk aversion in the Netherlands

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Abstract

This paper aims to analyse the relationship between a Dutch individual's risk aversion and their background information, personal endowments and character traits. This leads to the following research question: *Which personal characteristics and traits determine a Dutch individual's risk aversion for the period of 2002 to 2018?* This research determines if there is a significant correlation between the financial crisis in 2008 and a Dutch individual's risk aversion. The results of this paper show that personal characteristics and traits such as access to wealth, employment status, and gender of an individual show a significant relationship with risk aversion. However, the financial crisis in 2008, followed by the sovereign debt crisis in 2010, do not seem to have had a significant impact on risk aversion.

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1. Introduction

Does paying contactless with a PIN-card mean that a person is risk-loving? Does being married influence the amount of risks an individual takes? These factors and many others could have an unnoticed influence on a person's daily life. Risk aversion can also substantially influence financial decision making and various aspects of the financial world (Bucciol & Zarri, 2013). This leads to consequences for investment and trading decisions. Risk aversion affects the types of investments an individual makes as they try to avoid relatively high risk investments. Therefore, risk averse investors tend to stick with relatively safe investments with guaranteed returns such as governments bonds where the US treasury bonds are deemed to be the safest investments (He, Krishnamurthy, & Milbradt, 2016). For the same reason, risk averse investors require a higher risk equity premium compared to risk-neutral or risk-loving investors in order to compensate for the risks they are willing to take (Van der Sar, 2015).

The risk aversion of an individual is affected by many factors. The goal of this paper is to find out if there is a significant relationship between an individual's background information, personal endowments and characteristics, and their risk aversion. Some of the personal characteristics that affect risk aversion are personal abilities and wealth, demographic characteristics, measures of different kinds of risk exposures and budget constraints. As the empirical data covers the period of 2002 to 2018, the important economic shock of the 2008 financial crisis has to be considered. This is due to the fact that not only an individual's personal environment can affect their degree of risk aversion, but also events in the macroenvironment. The financial crisis began in 2008 in the US regarding housing prices, however quickly expanded globally in the consecutive weeks and months. This ultimately led to a sovereign debt crisis in Europe in 2010. A consequence might have been that Dutch individuals have adjusted their degree of risk aversion in order to be able to cope with the negative consequences of these crises, even if the Netherlands was one of the countries that was least affected by the 2008-crisis (Masselink & Van den Noord, 2009).

Based on these considerations, the following research question will be answered throughout this paper:

Which personal characteristics and traits determine a Dutch individual's risk aversion for the period of 2002 to 2018?

Research in the domain of risk aversion is very important and therefore socially relevant for several reasons. First, a society consisting of only risk averse people could lead to a slow national economic growth. This is due to the fact that risk averse individuals drive up prices of capital

investments, hence lower investments, as they require a higher compensation for the risks they take (Pålsson, 1996). A risk averse attitude could also hinder individual households to obtain a higher than average return on investments so that they forego potential increases of their wealth. On the other hand, it is known that on average, wealthier households take more risks than less wealthy households which may cause greater inequality in a society (Pålsson, 1996).

The studies considered in the literature review focus on data for either a single year or multiple years, meaning that cross-sectional data or panel data are used to conduct the research. However, none of the papers considers panel data from the Netherlands. This leads to a research gap in the existing literature, highlighting the scientific relevance of this paper. Therefore, the focus is on Dutch panel data (DHS Survey), in order to capture not only cross-sectional variations, but also time-varying components of risk aversion. In this paper, it is found that the financial crisis and the sovereign debt crisis were not significant when looking at a Dutch individual's risk aversion. Furthermore, background information, personal endowments and character traits seem to correlate with a Dutch individual's risk aversion.

This research paper is organised as follows: Primarily, relevant literature and studies will be considered to outline the background of this research paper. Furthermore, data collected from the DHS survey, which includes questions about individual's background information and characteristics will be empirically examined. Additionally, the methods used for the analysis of this data will be explained. Moreover, the results of several regressions on risk aversion to test the hypotheses will be illustrated. Then, these results are interpreted and discussed in the subsequent section. Lastly, a conclusion will answer the research question and a summary of the final and most important results will be provided.

2. Theoretical framework

2.1. Concepts and Definitions

First of all, several definitions will be provided in order to clarify the most important concepts in this paper. The first concept discussed is risk. Risk in the economic environment can be split into two components: the systematic and unsystematic risk. Systematic risk is related to the market movements in general. while unsystematic risk is firm-specific (Van der Sar, 2015). Individuals trying to minimise both types of risks are considered to be risk averse. Another definition suggests that a risk averse person is a person preferring a certain outcome to an uncertain outcome when both outcomes have the same expected utility (Menezes & Hanson, 1970). Consequently, being risk averse means that if the odds of each outcome are known, the lesser odds of a negative outcome will be chosen. In relation to an individual's wealth, this results in a concave utility function for a risk averse individual, meaning that as risk increases, the individual's marginal utility of wealth is diminishing (Rabin, 1999). This is the reason why risk averse people try to reduce risk by different means, e.g. they prefer paying a certain positive amount of money in order to keep the risk at the lowest level possible or even to completely eliminate risk. This can be illustrated by insurance contracts (Shefrin, 2008).

Expected utility refers to the utility that an individual expects to obtain based on the weighted-average of all the outcomes under the prevailing circumstances (Friedman & Savage, 1952). The weights depend on the probabilities that the events will actually occur. An additional concept related to expected utility is that risk averse individuals prefer preventing losses to making gains, known as loss aversion (Twersky & Kahneman, 1991). There are different measures of risk aversion in the expected utility theory including absolute risk aversion (ARR) and relative risk aversion (RRA) (Arrow & Pratt, 1965). Risk aversion also depends on the size, so on the magnitude of the win or the loss. This is described by Tversky and Kahneman's prospect theory (1992). The authors explain that on average people are risk averse when it comes to gains, but they are risk-seeking when it comes to losses. This means that people prefer smaller sure gains over uncertain larger gains, but they prefer higher eventual losses to lower certain losses.

However, most of the time, individuals are facing uncertain or ambiguous situations where the probabilities of various outcomes are unknown. As a consequence, an investor prefers an outcome where all the probabilities are known over an outcome where they are unknown; this preference is called ambiguity aversion (Knight, 1921).

2.2. Proxy variables for risk aversion

As this research focuses on how different personal characteristics influence the risk aversion of an individual, a proxy for risk aversion in the survey needs to be designated. Different proxy variables can be used to determine risk aversion. Dionne and Eeckhoudt (1985) show that as risk aversion increases, demand for self-insurance increases as well. This is supported by Briys and Schlesinger (1990) coming to the same results in their study. Karni and Zilcha (1986) even precise that there is a significant relationship between a particular type of insurance, namely life-insurance, and risk aversion. This is supported by Halek and Eisenhauer (2001) who also use in their research life insurance in order to determine the relative risk aversion coefficient.

Another very common proxy variable is a lottery choice where a person has to choose between two outcomes. These outcomes yield the same expected pay-off, but with one riskier option (smaller probability to win) with a higher pay-off and one less risky option (higher probability to win) with a lower pay-off (Burton & Shah, 2013).

A slightly different approach can be used when asking for participants' willingness to pay (WTP) to participate in a lottery. Such a proxy is for example used by Hartog, Ferrer-i-Carbonell, and Jonker (2002). In their study, the authors introduce a question about the WTP for the reservation of a lottery ticket given a certain probability to win a price of a certain magnitude and use these answers in order to create a proxy variable for risk aversion.

Since there is no question about a lottery and its pay-offs provided throughout the whole DHS survey, there is no possibility to use such a question as a proxy variable for risk aversion. However, as insurance and especially life-insurance are positively correlated with risk aversion, the following question will be used to build a proxy variable for risk aversion in this paper: "Did you, in or before [year before the survey was answered], take out SINGLE-PREMIUM INSURANCES and/or ANNUITY INSURANCES (pension insurance), which were still in effect on 31 December [year before the survey was answered]? Do not include pension arrangements provided by your employer or professional pension plans here." (retrieved from the DNB household survey, 2002)

2.3. Previous literature on the impact of personal endowments, background information and character traits on risk aversion

Research similar to the one conducted in this paper has been done by Guiso and Paiella (2008) for Italian households in 1995. They examined risk aversion by looking at two different measures: the constant absolute risk aversion (CARA) and the constant relative risk aversion (CRRA). These measures illustrate the fact that risk aversion is decreasing when wealth or income increase. The findings of

Guiso and Paiella indicate that young households take on average fewer risks compared to older households. Additionally, there is evidence that demographic characteristics and consumer attributes, with exception of education and region of birth, have little explanatory power when looking at the degree of risk aversion. Therefore, the authors consider that risk preferences are heterogenous and hence that it is challenging to define the risk preferences of the "representative agent". This is due to the fact that every individual has control over situations they put themselves into, meaning that more risk averse people prefer situations where they have to face lower risks.

Gusio and Paiella (2008) also highlight the point that people employed in the public sector are more risk averse than employees in the private sector. This is due to the fact that they value employment security and stability in the public sector more than risk-lovers. The labour market is dominated by risk averse people and therefore many people would prefer an employment in the public sector to an employment in the private sector (Bellante & Link, 1981).

However, risk aversion does not only have an effect on whether an individual is employed in the public or private sector, but also on the type of employment a person chooses. Risk averse people tend to choose employments with less variability in their income, called a wage employment, where the individual receives, depending on his contract, usually a fixed wage per month. This is contrary to self-employed people, who have no guaranteed monthly income and therefore are usually more risk-seeking (Di Mauro & Musumeci, 2011). The level of education an individual has attained is also crucial for an individual's risk aversion. This is due to the reason that it is highly correlated with the future employment. Shaw (1996) finds that risk aversion declines with the level of education, meaning that college-educated workers are on average more risk-takers than for example high school graduates.

According to Bommier, Chassagnon and Le Grand (2012), risk averse individuals tend to have higher savings in comparison to risk neutral or risk seeking people. It can be added that when income uncertainty arises that the risk averse individuals adjust their precautionary savings. However, not only savings but also the change in wealth and the level of wealth play an important role in the determination of risk aversion. Paravisini, Rappoport and Ravina (2010) determine that a negative unexpected chock in wealth lets an investor's risk aversion increase. However, Brunnermeier and Nagel (2006) found in their paper that changes in liquid wealth does not have an impact on an individual's time-varying risk aversion.

The relationship between relative risk aversion and household characteristics in 1985 in Sweden was examined by Pålsson (1996). She concluded that Swedish households are extremely risk averse in general. This is contradictory to Guiso and Paiella (2008) as she finds that on average, risk aversion seems to increase with age. She found that the economic variables - such as net wealth, income and

taxes - are not systematically correlated with the degree of relative risk aversion of the Swedish population.

In addition, the degree of risk aversion is likely to be influenced by an individuals' characteristics and environment. Eckel and Grossmann (2008) found evidence that men are less risk averse than woman which is reflected in many daily decisions e.g. choice of profession, investment decisions or even involvement in criminal activities. However, they point out that this is again susceptible to changes in the environment. Sunden and Surette (1998) conclude that gender and marital status have an impact on an individual's risk aversion. This is supported by Borghans, Golsteyn, Heckman and Meijers (2009) who found evidence for women being more risk averse than men. Furthermore, Sung and Hanna (1996) found that being married has an impact on an individual's risk aversion. They conclude that married couples are willing to take more risks than singles. But the results of Yao and Hanna (2005) add that it is still significant that married men take more substantial risks than married women. It is found that an individual's attitude towards risk is influenced by changes in their environment, which includes parenting (Halek & Eisenhauer, 2001). Parents become more risk-conscious than people without children and especially mothers are on average more risk averse than women without children (Lee, Macvarish, & Bristow, 2010). Görlitz and Tamm (2019) find that risk aversion is increasing already two years before the first child's birth, is at its maximum shortly after the birth, but decreases and even disappears when the child is becoming older.

2.4. Previous literature on the impact of the 2008-financial crisis on risk aversion

Finally, risk aversion is not only determined by individuals' characteristics, but also by major economic shocks. Risk aversion fluctuates over the business cycles, being higher during recessions and lower during expansions (Guiso, Sapienza, & Zingales, 2013). Considering the financial crisis in 2008, there is evidence that individual's risk aversion has increased in response to the events that incurred. Guiso et al. (2013) found evidence that in Italy risk aversion has significantly increased after the financial crisis. This is mainly due to the emotional fear resulting from income and wealth losses and the uncertainty that were present in the aftermath of the crisis. Guiso (2014) states that a financial crisis can even be considered to be a traumatic experience for an individual which is followed by a large and time-consuming adjustment in risk aversion. An individual reacts to a financial crisis by augmenting their risk aversion due to changes in the macroenvironment and individual endowments. This is due to psychological but also to economic factors which both seem to have an effect on the level of an individual's risk aversion (Guiso, 2014). This is supported by Coudert and Gex (2007) who find that financial crises are correlated with risk aversion.

In this paper, the relationship between various personal characteristics and traits e.g. wealth, gender, education, marital status, etc. and risk aversion will be tested for the Dutch population over the year 2002-2018 in order to find out if the results are consistent with the results of the previous-mentioned papers.

2.5. Sub-questions

Based on the previous extensive literature review on risk aversion, multiple sub-questions are formulated in order to be able to answer the central research question, *which personal characteristics and traits determine a Dutch individual's risk aversion for the period of 2002 to 2018?* Background information provided by this study includes details such as a person's gender, age, education etc., while personal endowments focus more on the net assets an individual owns. Furthermore, character traits describe the individuals' fundamental attributes which distinguish them from one another, e.g. whether an individual is willing to pay with the contactless option of a credit card or not. Finally, the role of the financial crisis in 2008 arising in the US can also impact an individual's degree of risk aversion. Following this, these four sub-questions arise:

SQ2: Do wealth, net or gross income have an effect on an individual's degree of risk aversion?
SQ1: Do age, gender, education, marital status or public employment have an effect on an individual's degree of risk aversion?
SQ3: Do expectations about future income, ways an individual spends or saves money, fact of paying with a PIN-card or paying contactless have an effect on an individual's degree of risk aversion?
SQ4: Did the financial crisis in 2008 have an effect on an individual's degree of risk aversion?

All of the sub-questions will be answered empirically using various regression models which will be explained more in detail in the methodology section.

2.6. Hypotheses based on the empirical sub-questions

Following these sub-questions and the theoretical framework, two hypotheses will be tested in order to analyse an individual's degree of risk aversion. The first hypothesis states that the personal endowments, background information and character traits have an impact on an individual's level of risk aversion. Subsequently, the second hypothesis states that the global financial crisis in 2008 had a significant impact on an individual's risk aversion which would be reflected by a change in behaviour.

H1: Individual risk aversion is affected by personal endowments, background information and character traits.
H2: Individual risk aversion was affected by the global financial crisis in 2008.

3. Data and Methods

The methodology of this research is mainly inspired by Guiso and Paiella (2008). Throughout this research, the effects of background information, personal endowments and character traits on risk aversion will be analysed mainly by using logit and probit regressions. Following this, a regression using three dummy variables for the years 2008, 2009 and 2010 will be performed to assess if the financial crisis in 2008 or the sovereign debt crisis in 2010 have an impact on an individual's degree of risk aversion. In order to perform this research, the statistical software Stata® is being used for all the regressions and calculations.

3.1 Data sources

The CentER data, Institute for Data Collection and Research provides the data for this research. The data is retrieved from the DNB household survey (DHS) which has been conducted yearly since 1993 by the Tilburg University (CentER data Tilburg University, 2020). This survey, which is subdivided into eight parts, asks questions related to general information about households, employment, health, income, and economic and psychological concepts. Those variables that were not directly available were computed to fit the needs of this paper.

3.2 Selection of the sample

First of all, the sample used for this research is based on the DHS which is conducted on a yearly basis using a computer-controlled questionnaire. The questions were answered by randomly chosen Dutch citizens. The individuals participating in the computer-controlled questionnaire are for both genders, all age categories and all social categories. Approximately 2000 household members take the survey each year and it is representative for the Dutch population (DHS survey, 1993). The respondents are first contacted via phone or postal mail and can decide whether they want to participate or not. If a respondent or household drops out after several years of participation, the data centre tries to find respondents with the same characteristics in order to replace the drop-out (DNB Occasional Studies, 2012).

The data used ranges from 2002 (wave 2003) to 2018 (wave 2018). The reason for this specific range is that the Euro was introduced only in January in 2002 to the public and since this survey is retrospective, the data is only expressed in Euros from 2002 onwards. Furthermore, the data set is large and unbalanced, meaning that the individuals are interviewed a different number of times.

Children are not considered in this research as they cannot make the decision whether to buy life insurance or not. This will be illustrated by the fact that the regressions will be run with an age restriction, including only individuals from the age of 18 years onwards.

This research is relevant for the Netherlands and it is highly probable that it will be relevant for countries with similar socio-demographic backgrounds as well. This could include other Western countries that are, for example, part of the European Union. However, this research cannot be used for countries with completely different socio-demographic backgrounds as the individuals' risk aversion is influenced by this background.

Finally, in order to perform this research, panel data is being used to analyse how risk aversion is being affected by several factors over multiple years. Hsiao (2005) states that the availability of panel data is beneficial for the research domain, as panel data has multiple advantages compared to cross-sectional or time-series data. This is due to the fact that panel data can not only capture either inter-individual or intra-individual differences but is able to look at both differences at the same time. It is more efficient to capture the complexity of individuals' behaviour with the use of panel data. Furthermore, panel data also has statistical advantages such as less multicollinearity between variables and more degrees of freedom (Hsiao, 2005).

3.3 Methods

3.3.1 Specification of the variables

In order to be able to analyse these hypotheses, the yearly data sets had to be merged into one panel data set which includes every individual's responses for every year he/she participated in the survey. This was done manually by first merging the eight sub-parts of the survey of each year with the help of a new variable called *individualnumber.* This variable is created based on the household number *nohhold* and the index of the member of the household *nomem*, making it unique for each person. Then, the merged data sets per year were merged into one data set including data over the whole time period considered in this research. Several variables had to be renamed manually in order to have consistency in the variables, as their names changed over the years. In order to assess the results of the aforementioned hypotheses, various variables, serving as explanatory variables will be used and put in these three aforementioned categories. A list of those questions, put in the three previously mentioned categories, can be found in Table 1 in Appendix 1.

Afterwards, the variable *lifeinsurance* was created in order to make a distinction between risk averse and risk seeking individuals. That variable is a binary variable which yields 1 if the individual has ever taken a life insurance during all the years he participated in the survey and 0 if not. This means that the variable indicates 1 even though when the individual's life insurance has already expired. This decision was taken due to the fact that an individual can be considered as risk averse when he decided to take a life insurance once in his life. From a certain age onwards, life insurance is becoming very expensive due to the increased probability of dying, so making people more reluctant to purchase it.

3.3.1.1 Endowment variables

There is no variable, or a direct proxy variable included in the survey which expresses the wealth of an individual or a household. Therefore, such a variable needed to be computed for each individual for each year based on assets and liabilities' information included in the DHS survey. Pesek and Saving (1968) define wealth, also known as net worth, as the difference between the value of all assets and cash on hand a person owns, and the liabilities that he owes. Therefore, the variable *wealth* was created using the total of the individual's assets and then deducting the individual's liabilities from it. The exact computation with a detailed list of every asset and liability can be found in Table 2 and Table 3 in Appendix 1. For those households where the wealth variable was missing, the variable is recorded as being equal to missing value. This will not cause a problem in this research as most of the missing variables for wealth were the wealth for children, which will be disregarded in this research as children do not purchase life insurance. The variables *totalnetincome* and *totalgrossincome* were included in the survey and did not have to be computed manually.

3.3.1.2 Background information variables

The variable *age* is created based on the difference between the year that the survey was taken and the year of birth. However, some observations had missing variables for the year of birth. As most of the individuals participated multiple years in the survey, this issue was relatively easy to fix manually as the year of birth could just been looked up from the previous or later years. Nonetheless, for a few individuals the year of birth could not been found and therefore the decision was made to exclude these individuals in the regressions by restricting the age to less than 105 years.

There was a single missing value in the whole dataset for the variable *positie* which indicates the position of the respondent in his household. However, the respondent has taken part in the survey multiple years, so it can be assumed that his position remained the same during this time span. Based on this variable, a new dummy variable was created *householdhead* to indicate if an individual is the household head or not.

Additionally, the variables *government, university* and *married* were created based on the variables *bzr01, oplmet* and *burgst,* respectively. The former is indicating whether the individual is either employed in the public or private sector or not employed at all. Then, *university* indicates whether the individual has completed a university degree or not. Finally, the latter states if the individual is currently married.

Another background variable relevant for this research is the degree of urbanization of the place the individual lives at. Therefore, the variable *urbanization* was created based on s*ted* included in the

survey. *Sted* indicated four different levels of urbanization ranging from a very low to a very high degree of urbanization. The decision was made to merge these into only two categories. One category indicates a high while the other one a low degree of urbanization.

Finally, *gender* indicating the gender of the respondent and *numberchildren* illustrating the number of children the individual has are also included in the background information of the respondent.

3.3.1.3 Character variables

Uitgeven is a variable assuming a number between 1 to 7 if the individual spends their saved money immediately (1) or if they save as much as possible (7). An individual who did not know what to respond to this question is treated as being indifferent between the two extreme choices. Hence, their answer is registered with a value of 4 as it is the median value. Follow this, *spending*, a new variable, is created based on the answers for *uitgeven*. The data points are regrouped into categorial variables where the values 1 to 3 indicate spending, 4 being indifferent between spending and saving and 5 to 7 saving.

The variable *perceptionincome* indicates if an individual perceives their income as regular, unusually high or low. This variable had multiple "I don't know" answers. The decision was made to include these answers in the category "regular" as an individual answering "I don't know" is assumed to have experienced no major changes in their income.

The variables *zinvol* and *opzij12* are variables where the answer is based on a scale from 1 (yes, certainly) to 4 (certainly not). The former variable asks the respondent if they believe it makes sense to save money considering the current general economic situation. The latter variable asks households if they plan on putting money aside in the following 12 months. Both variables had various missing values as people were unsure of the future. Therefore, the structure of the two variables is modified. The initial categories 3 and 4 are reclassified to be the new categories 4 and 5, respectively. A median category is then added; the median category states that the individual is indifferent between the two extreme choices. All the individuals that answered the question with "I don't know" are put into the median category. The variables *reasonable* and *futuresave* are created based on *zinvol* and *opzij12*. "Yes, certainly" and "yes, perhaps" are merged to create the new category "yes" for both variables. The same procedure is followed for "certainly not" and "perhaps not". The median category remains. *Pastsave* will also be included in this research illustrating whether the individual has saved money over the past 12 months or not.

Additionally, the variables *spaar1, spaar2, spaar4, spaar5* and *spaar6* analyse the individual's attitude related to different statements about risks in financial markets. The answer ranges from 1 (totally disagree) to 7 (totally agree). Also, repeatedly the variables were regrouped into only 3 categories changing them to disagree, indifferent and agree. The variables have then been renamed *saving1* to *saving6*.

The remaining variables have been renamed *moneyaside, payingpin* and *contactless* and are computed based on *potjes, pin2* and *nfc2* respectively. These variables track the response if an individual puts money aside for specific items, how often the person pays with a PIN-card and with the contactless option of a PIN-card, respectively.

3.3.2 Descriptive statistics

3.3.2.1 Characteristics of the variables

In this section, a table is provided including the main characteristics of each variable such as the number of observations, the mean, the standard deviation, the minimum and the maximum values.

Table 3.3.2.1.1. Descriptive Statistics

Variable	Number of observations	Mean	Standard Deviation	Minimum	Maximum
Lifeinsurance	44,879	0.28	0.45	0	1
Wealth	23,230	2.20e+07	3.32e+09	-4,731,250	5.07e+11
Totalgrossincome	30,951	30,930.75	25,614.44	0	700,000.00
Totalnetincome	26,468	24,592.64	21,866.11	-4,800.00	706,429.70
Year	62,586	2010.23	4.98	2002	2018
Age	62,586	49.09	16.85	18	100
Gender	62,586	1.51	0.50	1	2
Householdhead	62,570	1.29	0.45	1	2
University	62,415	0.11	0.32	0	1
Government	34,948	0.92	0.94	0	2
Numberchildren	62,586	0.85	1.12	0	7
Urbanization	62,204	0.39	0.49	0	1
Married	36,207	0.64	0.48	0	1
Perceptionincome	34,193	1.96	0.27	1	3
Pastsave	36,318	1.29	0.45	1	2
Reasonable	36,319	1.37	0.74	1	3
Futuresave	36,317	1.41	0.77	1	3
Saving1	34,230	2.49	0.78	1	3
Saving2	34,258	2.27	0.88	1	3
Saving4	34,240	2.64	0.65	1	3
Saving5	34,219	1.56	0.77	1	3
Saving6	34,256	1.41	0.69	1	3
Spending	37,442	2.58	0.68	1	3
Moneyaside	37,494	0.37	0.48	0	1
Payingpin	37,002	0.80	0.40	0	1
Contactless	5,815	2.03	0.89	1	3

3.3.2.2 Correlation table

The respective correlation table of the variables included in the research can be found below:

Table 3.3.2.2.1 Correlation table

Corr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1 lifeinsurance	1.00																									
2 wealth	0.009	1.00																								
3 totalgrossincome	0.229*	0.000	1.00																							
4 totalnetincome	0.172*	-0.001	0.753*	1.00																						
5 year	-0.049*	-0.001	-0.012*	-0.024*	1.00																					
6 age	0.044*	0.004	0.062*	0.052*	0.131*	1.00																				
7 gender	-0.155*	0.010	-0.394*	-0.312*	0.010*	-0.040*	1.00																			
8 householdhead	0.169*	0.002	0.447*	0.367*	0.006	0.215*	-0.533*	1.00																		
9 university	0.040*	-0.003	0.262*	0.223*	0.030*	-0.034*	-0.068*	0.119*	1.00																	
10 government	-0.135*	0.001	-0.264*	-0.189*	0.043*	0.510*	0.044*	-0.047*	-0.057*	1.00																
11 numberchildren	-0.011*	-0.004	-0.053*	-0.030*	-0.062*	-0.462*	-0.005	-0.179*	-0.059*	-0.254*	1.00															
12 urbanization	-0.018*	0.008	0.041*	0.034*	-0.016*	-0.016*	-0.002	0.073*	0.124*	-0.003	-0.134*	1.00														
13 married	0.067*	-0.008	0.020*	0.000	-0.043*	0.256*	-0.094*	-0.175*	-0.082*	0.059*	0.166*	-0.169*	1.00													
14 perceptionincome	0.048*	0.001	0.124*	0.097*	-0.045*	0.007	-0.010	-0.025*	0.019*	-0.064*	0.021*	-0.024*	0.074*	1.00												
15 pastsave	-0.069*	-0.004	-0.112*	-0.088*	0.027*	0.102*	-0.031*	0.066*	-0.018*	0.136*	-0.008	0.024*	-0.054*	-0.155*	1.00											
16 reasonable	-0.052*	-0.003	-0.023*	-0.008	0.046*	0.115*	-0.048*	0.034*	-0.017*	0.097*	-0.037*	0.024*	-0.007	-0.065*	0.256*	1.00										
17 futuresave	-0.061*	-0.004	-0.060*	-0.030*	-0.024*	0.145*	-0.037*	0.065*	-0.007	0.151*	-0.043*	0.022*	-0.035*	-0.103*	0.528*	0.375*	1.00									
18 saving1	0.042*	-0.004	0.027*	0.018*	-0.045*	-0.017*	0.049*	-0.023*	0.044*	-0.022*	0.000	-0.008	0.027*	0.044*	-0.073*	-0.099*	-0.066*	1.00								
19 saving2	-0.117*	0.006	-0.172*	-0.162*	0.068*	0.036*	0.160*	-0.107*	-0.128*	0.069*	-0.017*	0.008	0.0173*	-0.020*	0.020*	-0.007	-0.005	0.182*	1.00							
20 saving4	0.041*	-0.007	0.043*	0.041*	-0.056*	0.009	0.008	-0.001	0.046*	-0.014*	-0.010	-0.006	0.026*	0.034*	-0.065*	-0.081*	-0.060*	0.492*	0.189*	1.00						
21 saving5	0.070*	-0.005	0.083*	0.078*	0.104*	-0.050*	-0.127*	0.071*	0.057*	-0.067*	0.036*	-0.021*	-0.023*	-0.006	0.009	0.040*	0.007	-0.034*	-0.170*	0.030*	1.00					
22 saving6	0.083*	-0.004	0.146*	0.142*	0.005	-0.087*	-0.177*	0.096*	0.126*	-0.088*	0.035*	0.006	-0.058*	0.010	-0.017*	0.023*	-0.005	-0.157*	-0.356*	-0.068*	0.449*	1.00				
23 spending	0.053*	0.004	0.034*	0.031*	0.069*	0.179*	-0.020*	0.024*	0.023*	0.082*	-0.081*	-0.080*	0.072*	0.030*	-0.232*	-0.160*	-0.176*	0.102*	0.010	0.109*	0.014*	-0.002	1.00			
24 moneyaside	-0.005	-0.005	-0.022*	-0.024*	0.032*	-0.128*	0.049*	-0.033*	-0.056*	-0.077*	0.071*	0.019*	0.018*	0.002	-0.113*	-0.060*	-0.114*	-0.018*	0.036*	-0.016*	0.005	-0.009	0.022*	1.00		
25 payingpin	0.040*	0.003	0.090*	0.064*	0.105*	-0.100	0.039*	-0.028*	0.068*	-0.104*	0.036*	0.001	-0.016*	0.055*	-0.093*	-0.058*	-0.089*	0.023*	-0.019*	0.013*	0.022*	0.016*	-0.012*	0.022*	1.00	
26 contactless	-0.068*	-0.061*	0.077*	0.070*	0.325*	-0.221*	-0.055*	0.042*	0.086*	-0.128*	0.044*	0.103*	-0.094*	0.014	-0.036*	-0.034*	-0.026	-0.006	-0.048*	-0.019	0.048*	0.074*	-0.082*	0.016	0.276*	1.00

In this table, the pair-wise correlations of the variables used in the regressions can be found. The correlations which are marked with an asterisk (*) are significant at the 5% level.

3.3.3 Analytical Techniques

3.3.3.1 Logit and probit regressions

As previously discussed, the proxy for risk aversion, namely the question if an individual is covered by a life insurance or not, serves as the dependent variable in this paper. This should allow for the analysis of the impact of various characteristics and background information on risk aversion is being analysed. So, this binary choice variable (also referred to as dichotomous variable) is limited to the integers 0 and 1 with two possible outcomes, either no or yes. On the one hand, if the dichotomous variable is equal to 0 (no lifeinsurance), this means that the individual is assumed to be risk seeking while on the other hand, if this variable is equal to 1 (life insurance), the individual is considered to be risk averse.

Modelling regressions with a dichotomous dependent variable using linear regressions such as the Ordinary Least Square (OLS) method, which is suitable for analysing continuous variables, can give false results for dependent binary variables (Brooks, 2019). This could lead to predicted probabilities out of the range 0 to 1, heteroskedasticity and not normally distributed error terms. Therefore, an alternative approach is needed. Such alternatives can be the logit or probit models which need to be used in order to run regressions on a dependent dichotomous variable. In most of the probit and logit models, there are no major differences between the two outcomes (Brooks, 2019). This is illustrated

by the fact that there are lower estimates for a probit model for low probability values of the dependent variable and higher estimates for the high values of the estimated probabilities compared to the logit model. The two methods first estimate a linear regression and then transform it into a non-linear relationship. The distinction between those two models is that two different non-linear relations, called link functions, are used (Brooks, 2019).

First of all, the logistic regression, known as the logit model, and the probit regression, originating from the words probability and unit, are used to assess a relationship between a binary or an ordinary response variable and several explanatory variables by the method of maximum likelihood. The two functions are S-shaped and exist between their two asymptotes 0 and 1, making it impossible for the probabilities to be exactly equal to 0 or 1 (Brooks, 2019). The results of a logit or a probit regression usually present the odds of the event to occur conditional on a certain number of explanatory variables (Trueck & Rachev, 2009).

The logit function (3) and the probit function (4) are expressed as follows (Brooks, 2019):

(3) $F(z_i) = \frac{1}{1+e^{-z_i}}$

Where F is the cumulative logistic distribution of variable z_i

(4) $F(z_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_i} e^{-\frac{z_i^2}{2}} dz$

Where F is the cumulative distribution function for a standard normally distributed random variable z_i

Nonetheless, when running a logit regression in statistical softwares, the output is not directly representing the odds or the probability but only the coefficient. In order to be able to interpret the outcome of the regression, an inverse logarithmic transformation of the coefficient is needed to get the probability of the event (Brooks, 2019). Therefore, to obtain the probability of the event to happen, the following equation (5) is needed:

(5) $Pi = \frac{1}{1+e^{-(\beta_1+\beta_2*x_{2i}+\cdots+\beta_x*x_{ki}+u_i)}}$

However, the marginal effects of each explanatory variable on the risk aversion variable have to be added as the estimated coefficients of the probit/logit regressions are coefficients of non-linear models (Johnston & DiNardo, 1997). In such a case, each estimated coefficient depends on the level of the considered explanatory variable as well as on all the other variables used in our regression. Therefore, the focus will be first on the sign and the significance of the estimated probit/logit coefficients (Johnston & DiNardo, 1997). Then, the marginal effect of each explanatory variable will

be added in order to be able to comment on the impact on risk aversion. The marginal effect of each explanatory variable indicates how the proportion of risk averse individuals increases or decreases due to the considered explanatory variable, all else equal.

Since the dataset is panel data, the corresponding commands for the statistical test need to be adjusted in order to account for the panel data. Therefore, xtprobit and xtlogit models can be used to capture both the time-varying and individual-changing effects. So, an xtprobit model is used to fit either a population-average or a random-effects probit model while an xtlogit model can fit a population-average or a random-effects or a conditional fixed-effects logit model. All estimates in the xtlogit and xtprobit regressions are maximum likelihood estimators. (Stata, 2015).

In order to be able to choose between the two models, several information criteria can be used. The Schwarz's (1978) Bayesian Information Criterion (BIC) and the Akaike's (1974) Information Criterion (AIC) should be considered in order to decide which estimation method to use (Chen & Tsurumi, 2010). This means that the lowest score for the AIC and the BIC indicate which regression model suits the data best (Brooks, 2019). AIC usually indicates the models that are most likely to make good predictions, while BIC indicates the models based on the goodness of fit and the complexity of the model (Spiegelhalter, Best, Carlin, & Van der Linde, 2014). The AIC (3) (Akaike, 1974) and the BIC (4) (Schwarz, 1978) equations are as follows:

(6) $AIC = -2\ln(L) + 2k$

(7) $BIC = -2\ln(L) + k * \ln(N)$

where k = number of estimated parameters estimated in the model, L = maximized log-likelihood of the model and N = sample size

Probit models have been considered not feasible for panel data by some researchers including e.g. Cameron and Trivedi (2005). However, Van Praag (2015) concluded the opposite. Van Praag (2015) states that today's statistical softwares are able to perform probit regressions on panel data. This can also be used in Stata® which has a specific command for logit and probit with panel data settings.

In this paper, the results of the logit and probit regressions present the odds of taking a life-insurance conditional on personal endowments, background information and character traits. As risk aversion cannot directly be observed, it is assumed that the probability of taking life-insurance is representing the probability of being risk averse conditional on various independent variables.

Based on the theoretical analysis, the empirical model that will be examined in this paper, results in the following equation:

(8) $P(Y_i = 1|e_{1,i,t}, \dots, e_{l,i,t}, b_{1,i,t}, \dots, b_{k,i,t}, c_{1,i,t}, \dots, c_{m,i,t})$

According to Equation 8, the impact on an individual's risk aversion will be analysed depending on their personal endowments (designated by the variables e and the corresponding subscripts), background information (designated by the variables b and the corresponding subscripts) and character traits (designated by the variables c and the corresponding subscripts). For each category, a different number of variables will be analysed which is presented by the different subscripts k, l and m. Each variable is observed for a certain individual (characterized by the subscript i) for a certain year (represented by the subscript t). The different models using xtlogit and xtprobit regressions can be found in Appendix 1.

However, some of the explanatory variables are time-varying while others are not. For example, the variables gender, birth year and, from a certain age onwards, highest education completed do not change while age does change every year. Sex transformation is officially legal in the Netherlands since 2014 (Government of the Netherlands, 2014), but after analysing the dataset, it was visible that none of the individuals has undergone such a surgery.

This leads to the problem that a fixed effect model cannot be applied to the probit and logit regressions in this research. Firstly, the dependent variable lifeinsurance is time invariant, as it does not change per individual per year, making it impossible to apply the fixed effects. This leads to the conclusion that only random effects can be used in this research. Another reason behind this is that if explanatory variables are constant over time for an individual, such as the variable *gender*, the coefficients for these fixed variables are not getting estimated in the regressions. However, this leads to the issue that the coefficients of the random effects model might be biased (Baltagi, 2013). Stata® does not allow for the introduction of such a large number of dummy variables in order to test for the existence of individual effects, their potential correlation with the explanatory variables and the time-varying error term.

3.3.3.2 Stationarity tests

In order to examine the effect of a major economic event on a time-series variable, an analysis is needed if there is a significant change in the dependent variable before and after this event. To see if this effect is significant or not, either an Augmented Dickey-Fuller (ADF) test, when the event date is unknown, or a Chow test, when the event date is known, should be performed (Stock & Watson, 2015). However, as this paper uses panel data, these tests are not applicable. While taking into consideration the use of panel data, unit roots tests in Stata® can be run in order to analyse the stationarity of the data in this research. The xtunitroot has multiple sub-tests where one needs to be

chosen to perform the analysis. Nonetheless, these unit roots tests are also not applicable in this paper as the data set is strongly unbalanced and hence contains missing values for some individuals for some years, making every single unit root test unsuitable.

Therefore, the decision was made to create a dummy variable for the year 2008 in order to analyse the impact of the financial crisis in 2008 on risk aversion. This dummy variable indicates 0 if the survey was taken in any other year than 2008 and 1 if it was taken in the year 2008.

Nevertheless, the sovereign debt crisis in Europe in 2010 which was a consequence from the financial crisis in 2008 starting in the US can also have an impact on an individual's risk aversion. Thus, the decision is made to also create dummy variables for the years 2009 and 2010, applying the same logic as the dummy variable for 2008. A regression is run in order to evaluate the effect of these years on an individual's risk aversion.

4. Results

The section Methods describes how the two hypotheses will be explored empirically. Firstly, to reiterate, the subsequent two hypotheses were introduced in the section Theoretical framework. These are as follows:

H1: Individual risk aversion is affected by personal endowments, background information and character traits.

H2: Individual risk aversion was affected by the global financial crisis in 2008.

4.1. Choice of estimation method

Various logit and probit regressions are used in order to assess the results of these two hypotheses. Considering the AIC and BIC for each regression, the logit regressions, designated by uneven model numbers, are always in this research considered to be a better fit for the data than the probit models, the even number models. This is illustrated by the fact that no matter which endowment variable (wealth, total net income or total gross income) is included in the model and no matter which control variables are added, the logit regressions show the lower value for AIC and BIC compared to probit regression. The results for the AIC and BIC values can be found in Appendix 2 in Table 7 for Hypothesis 1 and in Appendix 3 in Table 3 for Hypothesis 2. This leads to the overall conclusion that the analysis for both hypotheses will be based on logit regressions. Therefore, the analysis will focus on the models 1,3 and 5.

4.2. Results for Hypothesis 1

In the tables below, an overview of the most important results of the logit regressions can be found based on different endowment variables. Tables 1 through Table 6, also included in Appendix 2, provide a more detailed representation of the results of every single regression. Furthermore, Tables 8 through 10, in Appendix 2 provide an overview of the marginal effects for the logit regressions.

Table 4.2.1. Results of logit regressions using wealth as independent variable

lifeinsurance	Model 1	Model 3	Model 5
wealth	1.45e-09	7.82e-07***	1.66e-06**
	(2.40e-08)	(4.35e-08)	(8.11e-07)
year	-0.0490*	-0.0376	-0.369
	(0.0257)	(0.0429)	(0.259)
age	0.00324	0.00439	0.293***
	(0.0120)	(0.0188)	(0.0344)
2.gender	-0.223	-26.68***	-0.103
	(0.325)	(0.507)	(0.604)
1.householdhead	0.125	-1.595**	2.477***
	(0.457)	(0.733)	(0.755)
1.university	-0.299	-3.939***	0.873
	(0.415)	(0.619)	(0.728)
2.government	-1.214***	-3.206***	-3.603***
	(0.369)	(0.570)	(0.816)
numberchildren	-0.0207	0.000446	0.860***
	(0.161)	(0.241)	(0.310)
1.urbanization	-0.131	-1.458***	-0.114
	(0.278)	(0.443)	(0.501)
2.perceptionincome	0.351	-0.0965	2.376***
	(0.562)	(0.899)	(0.900)
3.saving2		-1.489***	
		(0.491)	
3.contactless			-1.203**
			(0.593)
Constant	88.35*	57.50	716.4
	(51.73)	(86.24)	(521.0)
Control variables added: yes (see Table 1 Appendix 2)			

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

Table 4.2.2. Results of logit regressions using total gross income as independent variable

lifeinsurance	Model 1	Model 3	Model 5
totalgrossincome	1.30e-05*	2.81e-05***	2.06e-05
	(7.69e-06)	(9.55e-06)	(2.06e-05)
year	-0.0426	-0.0511*	-0.364
	(0.0284)	(0.0270)	(0.371)
age	-0.00467	0.00322	0.187***
	(0.0138)	(0.0128)	(0.0410)
2.gender	-0.731	-1.968***	-0.687
	(0.448)	(0.381)	(0.998)
1.government	-0.504	-0.373	-56.44***
	(0.503)	(0.450)	(2.342)
2.government	-1.079**	-1.113***	-2.797**
	(0.426)	(0.408)	(1.171)
2.futuresave	-0.240	-0.331	-19.84***
	(0.723)	(0.702)	(4.365)
3.saving2		-0.621**	
		(0.316)	
Constant	73.04	92.37*	708.4
	(56.98)	(54.19)	(748.5)
Control variables added: yes (see Table 3 Appendix 2)			

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

Table 4.2.3. Results of logit regressions using total net income as independent variable

lifeinsurance	Model 1	Model 3	Model 5
totalnetincome	-2.79e-07	2.27e-06	1.06e-05*
	(5.98e-06)	(5.23e-06)	(6.27e-06)
year	-0.0506**	-0.0488*	-0.437**
	(0.0249)	(0.0279)	(0.191)
age	0.0235*	0.0231*	0.285***
	(0.0121)	(0.0130)	(0.0252)
1.householdhead	-1.121***	-0.323	2.523***
	(0.389)	(0.408)	(0.535)
1.university	-0.820*	-0.612	1.891***
	(0.490)	(0.525)	(0.660)
2.government	-1.090***	-0.909**	-4.146***
	(0.369)	(0.391)	(0.615)
numberchildren	0.0845	0.157	0.588***
	(0.151)	(0.168)	(0.217)
1.married	0.0522	-0.102	1.362***
	(0.349)	(0.362)	(0.477)
2.pastsave	-0.153	-0.0544	-0.943*
	(0.312)	(0.348)	(0.506)
3.futuresave	-0.199	-0.127	-1.032*
	(0.376)	(0.420)	(0.592)
1.payingpin	0.140	0.135	1.425**
	(0.331)	(0.357)	(0.554)
Constant	92.75*	86.77	856.9**
	(50.08)	(55.98)	(383.8)
Control variables added: yes (See Table 5 Appendix 2)			

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

4.2.1 Endowment variables

Each model 1, 3 and 5 has been estimated with three different endowment variables: *wealth, totalgrossincome* or *totalnetincome*.

The coefficients of the variable *wealth* are positive and significant in Model 3 and Model 5 (Table 4.2.1.) at the 1% respectively 5% significance level. While its marginal effect for Model 3 is insignificant, the one for Model 5 is 5.28e-08 (Table 8, Appendix 2).

Considering the variable *totalgrossincome* in Model 1 and 3 (Table 4.2.2.), the coefficient is significant and positive at the 10%, respectively 5% level. Again, only the marginal effect for Model 3 is significant (Table 9, Appendix 2) and equals 4.77e-07.

Lastly, Model 5 (Table 4.2.3.) shows that *totalnetincome* has a significant coefficient at the 10% level. Here the marginal effect is equal to 3.34e-07 (Table 10, Appendix 2).

4.2.2 Background information variables

The categorical variable *government* has a significant coefficient in each logit regression that is being analysed in order to assess Hypothesis 1. First of all, the reference category of the variable indicates whether one is employed by the government. On average keeping every other variable constant, risk aversion decreases when not being employed at all due to retirement, being a student, etc. in comparison to the reference category. The coefficients of not being employed at all are all significant at the 1% with one exception (5% significance level only; Table 4.2.3., Model 3 (*totalnetincome*)). Regarding the marginal effects, provided from Tables 8 through 10 in Appendix 2, the odds of becoming less risk averse by not being employed at all, in comparison to the reference category, vary on average between 0.006 and 0.117, all else equal. This is depending on which model is used and which personal endowments variable is included. When using Model 1 (*totalgrossincome*), an individual who is not employed at all is 0.017 times less risk averse on average than an individual who is employed in the public sector, all else equal. If an individual is being employed in the private versus the public sector, the variable *government* has only a significant coefficient in Model 5 based on *totalgrossincome* (Table 4.2.2). The difference between being employed in the private sector, compared to the reference category, is significant at the 1% level. When being employed in the public sector, an individual is on average 0.387 times more likely to be risk averse than an individual employed in the private sector, all else equal. In the other models, there is no statistically significant difference between being employed in the public or private sector.

Looking at the variable *age*, it is visible that the coefficient of this variable is significant at the 1% level in Model 5 using *wealth* or *totalgrossincome* as personal endowment variable (Tables 4.2.1 and

4.2.2.). On average, being one year older increases the odds of being more risk averse by 0.0092 and 0.0048, respectively. However, this is a very small impact on risk aversion. In the regression including *totalnetincome*, the coefficient of the variable age is significant for each model (for Model 1 and 3 at the 10% level while for Model 5 at the 1% level; Table 4.2.3.). In general, the odds of being more risk averse when aging by one year are for the Models 1,3 and 5 are 0.0008, 0.0004 and 0.0090, respectively. It can be concluded, keeping other variables constant, that risk aversion is increasing on average when age increases.

Furthermore, the coefficient of the variable *gender* is significant at the 1% level in Model 3 when using either *wealth* or *totalgrossincome* (Table 4.2.1 and 4.2.2.). While the marginal effects are not significant in the former regression, the latter's results imply that on average, a man's degree of risk aversion is 0.024 times lower compared to a woman's, ceteris paribus. The variable *married* is significant at the 1% level only in Model 5 using total net income as independent variable (Table 4.2.3.). Although the regression still indicates that a person's risk aversion is on average increasing by 0.044 times when being married, all else equal.

Another variable, *householdhead,* designating the position of the respondent in the household, appears to be ambiguous. When considering Model 1 and Model 3 (Table 4.2.3. and 4.2.1.) containing *totalnetincome* and *wealth* respectively as independent variables, *householdhead* has significant (at the 1% respectively 5% significance level) negative coefficients. For Model 1 (*totalnetincome*), on average, the head of the household is 0.044 times less risk averse than other members of the household. For Model 3 (*wealth*), the marginal effects are insignificant. But, based on Model 5 (*totalnetincome*) and Model 5 (*wealth*) (Tables 4.2.3. and 4.2.1.), the coefficients are significant at the 1% level and positive. Ceteris paribus, these coefficients suggest that in general risk aversion increases 0.082 respectively 0.080 times when being the head of the household compared to other household members.

When considering Model 1 and 3 using *totalnetincome* and *wealth*, respectively, as independent variable (Tables 4.2.3. and 4.2.1.), risk aversion seems to decrease when the individual has obtained a university diploma (variable *university*). Both coefficients are significant at the 10% and 1%, respectively. These results mean that when considering Model 1 (*totalnetincome*) on average a college graduate is 0.022 times less risk averse than a person who has not graduated from college, all else equal. The marginal effect for Model 3 (*wealth*) is not significant. However, when looking at Model 5 (*totalnetincome*) (Table 4.2.3.), then the coefficient of risk aversion has a positive significance at the 1% level. All else equal, the marginal effect of this regression is that a college graduate is on average 0.060 times more risk averse compared to someone who has not graduated college.

The fact of being a mother or a father seem to have an impact on an individual's risk aversion. This is illustrated by the fact that in Model 5 including *wealth* or *totalnetincome* (Tables 4.1.1. and 4.1.3.), the coefficients of *numberchildren* are positive and significant at the 1% level. Keeping all other variables constant, a positive significant coefficient increases risk aversion on average by 0.027 times (Model 5, *wealth*), respectively by 0.018 times (Model 5, *totalnetincome*), per child in the household.

Finally, the variable *urbanization* is only significant in Model 3 (*wealth*). The coefficient is negative and significant at the 1% level. This means that on average, all else being equal, an individual who lives in an area with a (very) high degree of urbanization is less risk averse than an individual living in an area with a low or moderate degree of urbanization. However, the marginal effect of this coefficient is not statistically significant.

4.2.3 Character traits variables

It can be seen that an individual's perception of income in comparison to previous year's income can have an impact on their risk aversion. A person that perceives their income as unusually low in comparison to the one in the previous year is on average 0.075 times (Model 5, *wealth*) less risk averse, all else equal. This is illustrated by the fact that the coefficient of the variable *perceptionincome* is significantly positive at the 1% level in Model 5 using *wealth* as independent variable. The variable is not significant in Model 1 or Model 3 no matter which endowment variable is added.

When considering the variable *pastsave*, in Model 5 including *totalnetincome* (Table 4.2.3.), it is visible that the coefficient is significant at the 10% level and negative. On average, this means that, compared to saving money over the last 12 months, risk aversion decreases around 0.029 times when no money is being saved, ceteris paribus. For the other models is *pastsave* not statistically significant.

Looking at the variable *futuresave*, the effect is significant when considering Model 5 using *totalgrossincome* (Table 4.2.2.) and Model 5 using *totalnetincome* (Table 4.2.3.). In Model 5 (*totalgrossincome*), the coefficient of being indifferent to save money in the near future is negative and significant at the 1% level. This means that, compared to a person saying that he will save money in the future 12 months, a Dutch individual who is indifferent between saving or not, is 0.215 times more risk seeking, all else constant. However, considering the Model 5 (*totalnetincome*) and keeping all other variables unchanged again, risk aversion is decreasing on average 0.029 times when the individuals say that they will not save over the next 12 months compared to a person who says that they will save. Model 5 is the only model where the variable *futuresave* is statistically significant.

In Model 5 (*totalnetincome*), the variable *payingpin's* coefficient is significant at the 5% significance level and is positive (Table 4.2.3.). This indicates that compared to those individuals who

rarely pay by PIN card, a person who is actually using the PIN card more often is 0.044 times more likely to be risk averse, all else constant.

In addition to paying with a PIN card, the option of paying contactless with a PIN card (variable *contactless*) has risen in popularity over the last years. Therefore, it is being analysed if such an option is correlated with the degree of risk aversion of a person. In this research, it is visible that when considering Model 5 (*wealth*) (Table 4.2.1.), the coefficient of paying often with the contactless option is significantly negative at the 1% level, meaning that risk aversion would decline 0.038 times on average, all else equal, in comparison to seldomly paying contactless.

Considering the variable saving2 in relation with total gross income or wealth, it can be noted that on average, ceteris paribus, individuals thinking that an investment in shares is too risky seem to be less risk averse than investors in shares.

Finally, the coefficients of the variables *saving1, saving4, saving5, reasonable, spending and moneyaside* are never significant in any regression included in this research, while saving6 is only significant in one probit regression which is considered to be a poorer fit of the data than the logit regression (Table 2, Appendix 2).

4.3. Results for Hypothesis 2

This section provides the table containing the most substantial results which permit to inspect Hypothesis 2. Model 7, Model 8 and Model 9 have wealth, total gross income and total net income respectively as independent variables. Those models were again chosen based on the AIC and BIC. In Appendix 3, Table 1 and Table 2 illustrate the complete results, Table 3 provides the AIC and BIC of the regressions.

Table 4.3.1. Logit regressions analysing the change in risk aversion over the years 2008-2010

lifeinsurance	Model 7	Model 8	Model 9
wealth	1.92e-09		
	(6.93e-09)		
totalgrossincome		1.21e-05***	
		(2.86e-06)	
totalnetincome			5.94e-06***
			(2.25e-06)
d2008	0.219	0.207	0.0870
	(0.593)	(0.563)	(0.902)
d2009	0.308	0.228	0.159
	(0.634)	(0.588)	(0.850)
d2010	0.235	0.188	-0.0231
	(0.590)	(0.578)	(0.888)
Control variables added: yes (see Appendix 3)			

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

While considering the regressions in this research, the coefficient of the variable *year* is often significant in the analysis of Hypothesis 1 (Table 4.2.1. to 4.2.3.). Based on these results, the decision was taken to analyse the effects of the three consecutive years of the financial crisis that started in the US in 2008. Therefore, the three dummy variables, *d2008, d2009* and *d2010,* have been created for the years 2008, 2009 and 2010. These variables are regressed on the variable lifeinsurance. However, in the three regressions using *wealth*, *totalnetincome* or *totalgrossincome* respectively as an independent variable, the three dummy variables' coefficients are insignificant (Table 4.3.1.). The results make it seem like the financial crisis did not have an impact on an individual's risk aversion in the Netherlands. The z-values for three dummy variables' coefficients for Model 7, 8 and 9 can be found in Table 14, Appendix 3. This leads to the conclusion that the second hypothesis can be rejected as the effect on risk aversion is not significant.

4.4 Unexpected results

Looking at the theory for logit and probit models, it is assumed that logit models fit continuous binary variables better while probit models are supposed to fit discrete binary variables better. However, considering the two information criteria AIC and BIC, it can be concluded that in this research the logit models fit the data better than the probit models.

Another surprising result is that in this research, the financial crisis in 2008 does not seem to have a statistically significant effect on a Dutch individual's risk aversion. It was expected that risk aversion would be affected by the financial crisis, so that Hypothesis 2 would not be rejected, such as found by Guiso et al. (2013). They stated that the financial crisis in 2008 had an impact on an individual's risk aversion when considering the Italian population's risk aversion (Guiso & al., 2013).

5. Discussion

5.1. Discussion of results for Hypothesis 1

5.1.1. Personal endowments

In general, it can be seen that an individual's endowments have an impact on its risk aversion. This is illustrated by the fact that the variables *wealth, totalgrossincome* and *totalnetincome* have significant coefficients in most of the regressions as described in the Results section. All the significant coefficients are positive, meaning that risk aversion is increasing when the personal endowments are increasing. However, the coefficients are so small that they have a very limited impact on risk aversion. This is contradictory compared to the literature by Guiso and Paiella (2008) which considers that higher wealth or revenue should decrease risk aversion. It can be concluded that background information and character traits seem to be more important for Dutch individuals when analysing risk aversion than personal endowments.

5.1.2. Background information

The results show that risk aversion decreases on average when employed in the private sector compared to the public sector, all else being equal. This is in line with the findings of Guiso and Paiella (2008), Bellante and Link (1981) and Di Mauro and Musumeci (2011) which all state that people employed by the government are on average more risk averse. These observations could be explained by the fact that there is higher job security and better terms of service in the public sector compared to the private sector. Such features are preferred by a risk averse individual. It is also found that risk aversion decreases when not being employed at all compared to the reference category which is being employed in the public sector. This corresponds to the observation by Feinberg (1977) that risk-seekers are longer unemployed than risk averse individuals. A possible explanation could be that risk-seekers might be waiting longer for better opportunities on the labour market.

Borghans et al. (2009) come to the same conclusion as in this paper that women are in general more risk averse than men. Sung and Hanna (1996) add to this that married people are in general more willing to take risks than single individuals.

The positive correlation between age and risk aversion is contradictory to the results found by Guiso and Paiella (2008) but coincides with the findings of Pålsson (1996). A possible explanation as to why risk aversion seems to increase with age in this research is that older people are often less willing to accept gambles than younger people (Albert & Duffy, 2012). Therefore, younger people are more likely to subscribe to a lifeinsurance contract. Additionally, older people are also less willing to hold risky assets in their investment portfolio compared to younger people which also shows an

increase in risk aversion (Jianakoplos & Bernasek, 2006). Grubb, Tymula, Gilaie-Dotan, Glimcher and Levy (2016) found evidence that risk aversion is increasing with age as the structure of the brain changes when people get older. Older people have a diminished grey matter volume compared to younger people which makes them less tolerant towards risk. However, the effects of age seem to be very small in this research and the impact on risk aversion is therefore only limited (Grubb & al., 2016).

According to Shaw (1996), higher education seems to decrease the degree of risk aversion of an individual. In this research, most of the times the coefficient for higher education is negative when it is statistically significant. A possible reason is that higher education teaches students how to better deal with risks when facing them, while prior education focusses more on how to avoid risks (Jung, 2014). Nonetheless, the coefficient for higher education is also significantly positive in one of the regressions, meaning that higher education would increase risk aversion. This means that the effect of obtaining a university diploma is ambiguous in this research and no concrete conclusion can be drawn.

Risk aversion appears to be lower for people living in a city than for people living in a rural area. This is in line with the findings of Shi and Yan (2018) who concluded that risk aversion is higher for people living in an area with lower urbanization. A possible explanation for this is that people in urban areas are more exposed to traffic, more competition on the labour market and have to deal with more uncertainty in their daily lives (Shi & Yan, 2018).

Finally, risk aversion is increasing with parenting (variable *numberchildren*) which is found by Halek and Eisenhauer (2001). This is in agreement with the evidence that Lee et al. (2010) found. A possible reason could be that parents usually try to protect their children in every way that is possible. Most of the parents try to get more stable jobs or take safer financial decisions in order to guarantee their kid(s) a safe future with good opportunities. A lot of parents also try to protect their children from failures and want to be role models for their children.

5.1.3. Character traits

The results show that an individual that perceives their income as normal, compared to unusually low perceived income, is more risk averse which is coherent with the findings of Paravisini et al. (2010). A possible reason for such a behaviour could be that individuals who consider their income to be low think that there is less to lose and therefore they could make more irrational decisions regarding risks. Another reason for these results could be that individuals are expecting a future increase in their income and are considering a decrease in income only as temporary.

The results found for the variables *pastsave* and *futuresave* are in line with the findings of Brommier et al. (2012) as they state that risk aversion is increasing when the savings rate is increasing as well. Saving more money in the present is building up higher reserves for the future which could be used in case something unexpected is happening. This could be a possible explanation for why risk averse people prefer to have a higher savings and can be explained by the fact that risk averse people tend to set aside money in order to be prepared for unexpected changes.

In this research, Dutch individuals paying by PIN card (variable *payingpin*) seem to be more risk averse than those who do not use a PIN card. Those results can be supported by the fact that it is easier to lose cash than to lose your credit card. Additionally, a person who has lost their credit card can block it easily by calling the bank which decreases the risk of actually losing money. Furthermore, risk aversion seems to increase when one pays often contactless as the coefficient for *contactless* is significantly negative. Such an observation could be supported by the fact that it is easier to pay contactless as no PIN code is required, which would also make it easier to pay for the wrong amount or for others to pay with one's credit card.

Finally, risk aversion seems to decrease when an individual thinks it is too risky to invest into shares. This is a very unexpected result and does not align with the findings of He et al. (2016) and Van der Sar (2015). One possible explanation could be that the individuals who answered this question with "agree" can consider purchasing a lifeinsurance (which is used as the dependent variable in this research) as risky as investing into shares. This might be due to the fact that a lifeinsurance is a low liquidity long-term contract and risk averse individuals prefer to have liquidity.

5.2. Discussion of results for Hypothesis 2

These results are contradictory to the findings of Guiso et al. (2013) who state that in Italy individual's risk aversion was affected by the financial crisis and that one adapted a more careful approach towards risk. A possible reason for the changes in these results is that two different countries were used to analyse the impact of the financial crisis on risk aversion. While looking at two different countries, it is possible that their respective citizens differ in their mentalities which could lead to a different perception of risk aversion. Furthermore, it is known that the financial crisis in 2008 had a more severe financial impact on Italy than on the Netherlands. This is illustrated by the fact that the gross domestic product in 2009 in Italy fell by 5% compared to the average value recorded in the previous year and that the unemployment rate rose to 7.8% (Coletto, 2010). At the same time, the gross domestic product in the Netherlands decreased in 2009 by 4.5% in comparison to 2008 and the unemployment rate reached around 3%, making it the lowest in Europe at that point in time

(Masselink & Van den Noord, 2009). This could possibly explain why the Italian population adjusted more for risks than the Dutch population after the crisis.

Looking at all the results found in this research, it can be concluded that the results are not very robust as most of the coefficients are very low and seem to have only a limited impact on risk aversion. This highlights the limitations of this study.

5.3. Limitations

While comparing this research to Guiso and Paiella's (2008) paper, some limitations arise. A key limitation is that the DHS dataset does not include a question which could be used to estimate an individual's utility function. Therefore, the absolute and relative risk aversion with respect to wealth cannot be measured in this research. Unfortunately, due to this data unavailability of the Dutch population, having no utility function information, reduces the completeness of these results.

Furthermore, another key limitation is that a proxy is being used for asserting an individual's risk aversion. In this research, it was not possible to ask every single respondent a question directly measuring their risk aversion. This could make the research less accurate which might be explained by the lack of robustness of the results. Another limitation is that fixed effects cannot be used for the logit and probit models due to certain variables not varying over time such as *lifeinsurance* or *gender.* A final limitation is the time constraint of this paper. This topic could be researched more in-depth and completed with some more research and data collection making the research more reliable.

Clearly there are limitations to this research and the results cannot be projected to every other population. There is a high chance that these results are similar to results one would obtain while analysing other EU-countries, but still differences can arise due to different macroeconomic contexts. This is already visible, for example, by looking at the different impact of the financial crisis on Italian individual's risk aversion compared to Dutch individuals' risk aversion. Furthermore, these results cannot be extended to countries with a completely different socio-demographic background compared to the Netherlands. This leads to a gap for further research in this domain. An individual's risk aversion could be analysed in other regions with different cultures in order to see if there are significant differences.

6. Conclusion

This paper aims to analyse a Dutch individual's risk aversion over the time span of 2002 to 2018. Various factors can have an impact on a person's risk aversion, as discussed in the literature review, leading to the following research question: *Which personal characteristics and traits determine a Dutch individual's risk aversion considering the period of 2002-2018?*

The first hypothesis of this paper cannot be rejected. It is found that various variables such as *wealth, totalnetincome, totalgrossincome, age, gender, government* and *futuresave* have a significant impact on a Dutch individual's risk aversion which is in line with the previous literature that was considered in this research. The most important results show that being employed by the government or getting older seems to increase an individual's risk aversion.

In general, it can be noticed that personal endowments, background information and character traits are correlated with an individual's risk aversion. However, not every variable included in this research has a significant effect on an individual's risk aversion at the 10% significance level.

The second hypothesis that is being analysed, can be rejected, as the Dutch population does not seem to have adjusted their risk aversion during or after the financial crisis followed by the sovereign debt crisis in 2010. The three dummy variables created for the years 2008, 2009 and 2010 are insignificant in every regression in this research indicating that the impact of these years was negligible for an individual's risk aversion in the Netherlands. This is contradictive to previous literature in which the Italian population's risk aversion was examined. A possible reason could be that the Netherlands were the least affected country by the financial crisis in 2008 according to Masselink and Van den Noord (2009). Therefore, compared to the Italian population, the Dutch population may have adjusted less for risk during the years 2008 to 2010 which could be a possible explanation for swhy the results are statistically insignificant.

As this paper comes with several limitations, there is room for further research regarding this topic. This research could be performed during a longer time period where there is more time to perform an in-depth analysis in order to eliminate the time constraint factor. A suggestion for further research is that this research could be done using another proxy variable for risk aversion in order to assess whether the results are similar. Otherwise, further research could also be done in another European country to verify if risk aversion changes from country to country.

Finally, this paper is written in the year 2020 in which risk aversion is a very relevant topic. Due to the ongoing sanitary crisis caused by the Covid-19, the real economy and the stock markets have been struggling since the end of February 2020. The global economy is experiencing slow growth and the

indexes were severely impacted by this pandemic. Innumerable people have lost their jobs and many companies are facing financial distress which could lead to bankruptcies. If this crisis is comparable to the crisis in 2008 in terms of economic impact, people will change their attitude towards risk and become more risk averse (Guiso & al. 2013). However, there is still a lot of uncertainty and further research needed in order to figure out whether there is an effect of this economic crisis on an individual's risk aversion or not. At this point in time, it is not yet known if this crisis will have a larger impact on the Dutch society than the one in 2008. It might entail a significant effect of adjustment for risk aversion in the Dutch population.

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Appendix 1

Table 1 List of variables and explanations

Name of the variable	In the survey/self-computed	Values of the variable and explanations	Category in which the variable is put in
Aantalki (numberchildren)	In the survey	Range from 0 to 7	Background information
Age	Self-computed: Difference between year and birth year	Range from 0 to 100	Background information
Btot (totalgrossincome, Individual's total gross income)	In the survey	Range from 0 to 700.000	Endowments
Contactless (How often do you use your PIN card paying contactless?)	Self-computed: based on NFC2	1= seldom 2= sometimes 3= often	Character traits
Futuresave (If the individual plans to save money in the next 12 months)	Self-computed: based on the variable opzij12	1= yes 2= indifferent 3= no	Character traits
Geslacht (gender)	In the survey	0= male 1= female	Background information
Government (If the individual is employed by the government, in the private sector or not at all)	Self-computed: based on the variable bzr01	0= employed by the government 1= employed in the private sector 2= not employed at all (student, retired, housewife, disabled etc.)	Background information
Headhh (householdhead, if the individual is the head of the household or not)	Self-computed: based on the variable positie in the survey	0= any other position in the household 1= head of the household	Background information
Inknorm (perceptionincome, How the income of the individual has changed compared to the previous year)	In the survey	1= unusually low 2= regular 3= unusually high	Character traits
Lifeinsurance (If the individual ever took a life insurance in his life)	Self-computed: based on the variable bz07	0= no 1= yes	Endowments
Married (If the individual is married or not)	Self-computed: based on the variable burgst	0= not married 1= married	Background information
Moneyaside (Do you put money aside for particular purposes (holidays, clothes, rent etc.) in order to reserve separate amounts for different purposes? For example, by depositing money into separate bank accounts, or by putting money in separate envelopes or jars)	Self-computed: based on the variable potjes	0= no 1= yes	Character traits

Name of the variable	In the survey/self-computed	Values of the variable and explanations	Category in which the variable is put in
NFC1 (Do you own one or more PIN cards that allow contactless payments?)	In the survey	1= yes 2= no	Character traits
NFC2 (How often do you use your PIN card paying contactless?)	In the survey	1= never 2= seldom 3= every now and then 4= often (that is (almost) every week) 5= very often (that is (almost) every day)	Character traits
Ntot (totalnetincome, Individual's total net income)	In the survey	Range from -4.800 to 706.429,7	Endowments
Opzij (pastsave, If the individual saved money in the past 12 months)	In the survey	1=yes 2=no	Character traits
Payingpin (How often do you use a PIN card?)	Self-computed: based on Pin2	0=seldom 1=often	Character traits
Pin1 (Do you own a PIN card that you use to pay)	In the survey	1= yes 2= no	Character traits
Pin2 (How often do you use a PIN card?)	In the survey	1= never or very rarely 2= every now and then 3= often 4= very often	
Reasonable (If the individual thinks that it makes sense to save money regarding the general current economic situation)	Self-computed: based on the variable zinvol	1= yes 2= indifferent 3= no	Character traits
Spaar1grouped (saving1, 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)	Self-computed: based on the variable spaar1	1= disagree 2= indifferent 3= agree	Character traits
Spaar2grouped (saving2, I do not invest in shares, because I find this too risky)	Self-computed: based on the variable spaar2	1= disagree 2= indifferent 3= agree	Character traits
Spaar4grouped (saving4, I want to be certain that my investments are safe)	Self-computed: based on the variable spaar4	1= disagree 2= indifferent 3= agree	Character traits
Spaar5grouped (saving5, If I want to improve my financial position, I should take financial risks)	Self-computed: based on the variable spaar5	1= disagree 2= indifferent 3= agree	Character traits
Spaar6grouped (saving6, I am prepared to take the risk to lose money, when there is also a chance to gain money)	Self-computed: based on the variable spaar6	1= disagree 2= indifferent 3= agree	Character traits

Name of the variable	In the survey/self-computed	Values of the variable and explanations	Category in which the variable is put in
Spending (Some people spend all their income immediately. Others save some money in order to have something to fall back on. Please indicate what you do with money that remains after having paid for food, rent, and other necessities.)	Self-computed: based on the variable uitgeven	1= spending 2= indifferent 3= saving	Character traits
University (If the individual has a university degree or not)	Self-computed: based on the variable oplmet	0= no university diploma 1= university diploma	Background information
Urbanization (In which degree of urbanization the individual lives)	Self-computed: based on the variable sted	0= moderate/low degree of urbanization 1= (very) high degree of urbanization	Background information
Wealth	Self-computed: based on all the assets and liabilities in the survey plus the housing information	Range from -4.731.250 to 5.07e+11	Endowments
Year	In the survey	Range from 2002 to 2018	Background information

Table 2 Summary of assets used to calculate wealth

Abbreviation of the variable	Explanation of the variable
b1b	Total amount checking accounts
b2b	Total amount employer-sponsored savings plan
b3b	Total amount savings
b4b	Total amount deposit books
b6b	Total amount savings certificates
b7b	Total amount single-premium annuity insurance policies
b8b	Total amount savings/endowments insurance policies
b12b	Total amount mutual funds/accounts
b13b	Total amount bonds/mortgage bonds
b14b	Total amount shares
b15b	Total amount put-options bought
b16b	Total amount put-options written
b17b	Total amount call-options bought
b18b	Total amount call-options written
b19ogb	Total amount real estate
b20b	Total amount cars
b21b	Total amount motors
b22b	Total amount boats
b23b	Total amount caravans
b24b	Total amount money lent out to family/friends
b25b	Total amount savings/investments NOT mentioned before
b26ogb	Total amount owner of house (and backyards)
b27ogb	Total amount owner of a second house
b29b	Business equity
b30b	Business equity (self-employed)

Table 3 Summary of liabilities used to calculate wealth

Abbreviation of the variable	Explanation of the variable
s1b	Total amount private loans
s2b	Total amount extended lines of credit
s3b	Total amount debts with mail-order firms
s4b	Total amount debts hire-purchase contract
s5b	Total amount loans from family/friends
s6b	Total amount study loans
s7b	Total amount credit card debts
s8b	Total amount loans not mentioned before
b12hyb	Total amount mortgages on real estate
b26hyb	Total amount mortgages on house
b27hyb	Total amount mortgages second house

Appendix 2

List of regressions using wealth as independent variable

Regression 1: xtlogit lifeinsurance wealth year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin i.contactless

Regression 2: xtprobit lifeinsurance wealth year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin i.contactless

Regression 3: xtlogit lifeinsurance wealth year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.spaar1grouped i.spaar2grouped i.spaar4grouped i.spaar5grouped i.spaar6grouped i.spending i.moneyaside i.payingpin

Regression 4: xtprobit lifeinsurance wealth year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.spaar1grouped i.spaar2grouped i.spaar4grouped i.spaar5grouped i.spaar6grouped i.spending i.moneyaside i.pin1 i.payingpin

Regression 5: xtlogit lifeinsurance wealth year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin i.contactless

Regression 6: xtprobit lifeinsurance wealth year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin i.contactless

Table 1 Logit regressions full results using wealth as independent variable

	(1)	(2)	(3)
lifeinsurance	Model 1	Model 3	Model 5
wealth	1.45e-09	7.82e-07***	1.66e-06**
	(2.40e-08)	(4.35e-08)	(8.11e-07)
year	-0.0490*	-0.0376	-0.369
	(0.0257)	(0.0429)	(0.259)
age	0.00324	0.00439	0.293***
	(0.0120)	(0.0188)	(0.0344)
2.geslacht	-0.223	-26.68***	-0.103
	(0.325)	(0.507)	(0.604)
1.headhh	0.125	-1.595**	2.477***
	(0.457)	(0.733)	(0.755)
1.university	-0.299	-3.939***	0.873
	(0.415)	(0.619)	(0.728)
1.government	-0.245	-0.283	-1.340
	(0.421)	(0.676)	(0.843)
2.government	-1.214***	-3.206***	-3.603***
	(0.369)	(0.570)	(0.816)
aantalki	-0.0207	0.000446	0.860***
	(0.161)	(0.241)	(0.310)
1.urbanization	-0.131	-1.458***	-0.114
	(0.278)	(0.443)	(0.501)
1.married	-0.00378	0.322	0.643
	(0.315)	(0.488)	(0.609)
2.inknorm	0.351	-0.0965	2.376***
	(0.562)	(0.899)	(0.900)
3.inknorm	0.812	0.792	2.248
	(1.108)	(1.681)	(1.760)
2.reasonable	-0.416	-0.189	-3.208
	(0.686)	(1.112)	(1.960)
3.reasonable	-0.238	-0.469	-0.273
	(0.369)	(0.556)	(0.597)
2.opzij	-0.304	-0.876	-0.994
	(0.330)	(0.535)	(0.660)
2.futuresave	0.147	0.670	1.628
	(0.687)	(1.121)	(2.717)
3.futuresave	-0.102	-0.295	-0.661
	(0.398)	(0.624)	(0.710)
2.spaar1grouped		0.477	
		(0.729)	
3.spaar1grouped		0.401	
		(0.578)	
2.spaar2grouped		-0.380	
		(0.679)	
3.spaar2grouped		-1.489***	
		(0.491)	
2.spaar4grouped		-0.118	
		(0.851)	
3.spaar4grouped		0.406	
		(0.767)	
2.spaar5grouped		0.174	
		(0.502)	

3.spaar5grouped		0.430	
		(0.574)	
2.spaar6grouped		0.428	
		(0.557)	
3.spaar6grouped		0.790	
		(0.693)	
2.spending		-0.407	0.144
		(0.702)	(0.903)
3.spending		-0.154	0.542
		(0.639)	(0.786)
1.moneyaside		-0.119	-0.0924
		(0.409)	(0.503)
1.payingpin	0.118	-0.285	0.962
	(0.325)	(0.556)	(0.669)
2.contactless			-0.591
			(0.636)
3.contactless			-1.203**
			(0.593)
Constant	88.35*	57.50	716.4
	(51.73)	(86.24)	(521.0)
Observations	19,185	18,479	3,317
Number of individualnumber	4,329	4,182	1,648

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

Table 2 Probit regressions full results using wealth as independent variable

	(1)	(2)	(3)
lifeinsurance	Model 2	Model 4	Model 6
wealth	2.06e-09	1.65e-09	3.02e-06***
	(7.14e-09)	(7.47e-09)	(6.08e-07)
year	-0.0470***	-0.0446***	-0.0182
	(0.0103)	(0.0109)	(0.113)
age	0.0456***	0.0442***	0.0581***
	(0.00509)	(0.00566)	(0.0126)
2.geslacht	-1.500***	-1.201***	-0.394
	(0.209)	(0.267)	(0.304)
1.headhh	0.422*	0.563**	0.288
	(0.244)	(0.276)	(0.443)
1.university	0.375**	0.200	0.201
	(0.161)	(0.167)	(0.428)
1.government	-0.287	-0.268	-0.311
	(0.192)	(0.194)	(0.441)
2.government	-0.931***	-0.996***	-1.180***
	(0.150)	(0.165)	(0.406)
aantalki	0.161**	0.146**	0.187
	(0.0639)	(0.0641)	(0.178)
1.urbanization	-0.236**	-0.210*	-0.188
	(0.120)	(0.125)	(0.278)
1.married	0.338**	0.356**	-1.387***
	(0.149)	(0.151)	(0.319)
2.inknorm	0.240	0.172	0.363
	(0.216)	(0.234)	(0.539)
3.inknorm	0.685	0.635	0.719
	(0.422)	(0.443)	(1.071)
2.reasonable	-0.327	-0.320	-0.533
	(0.261)	(0.277)	(0.896)
3.reasonable	-0.212	-0.192	-0.0674
	(0.136)	(0.143)	(0.323)
2.opzij	-0.168	-0.162	-0.220
	(0.123)	(0.131)	(0.324)
2.futuresave	0.0251	0.00842	0.257
	(0.266)	(0.279)	(0.997)
3.futuresave	-0.0840	-0.0664	-0.148
	(0.146)	(0.154)	(0.377)
2.spaar1grouped		0.0859	
		(0.173)	
3.spaar1grouped		0.280**	
		(0.142)	
2.spaar2grouped		-0.248	
		(0.157)	
3.spaar2grouped		-0.534***	
		(0.121)	
2.spaar4grouped		0.145	
		(0.206)	
3.spaar4grouped		0.222	
		(0.186)	
2.spaar5grouped		0.104	
		(0.128)	
3.spaar5grouped		0.166	
		(0.137)	

2.spaar6grouped		0.115	
		(0.135)	
3.spaar6grouped		0.288*	
		(0.161)	
2.spending		0.114	-0.00967
		(0.200)	(0.506)
3.spending		0.214	0.0265
		(0.181)	(0.458)
1.moneyaside		-0.115	-0.108
		(0.107)	(0.256)
1.payingpin	0.156	0.147	0.175
	(0.127)	(0.132)	(0.383)
2.contactless			-0.175
			(0.308)
3.contactless			-0.321
			(0.311)
Constant	90.05***	84.80***	28.33
	(20.75)	(21.91)	(228.2)
Observations	19,185	18,479	3,317
Number of individualnumber	4,329	4,182	1,648

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

List of regressions using total gross income as independent variable

Regression 1: xtlogit lifeinsurance btot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 2: xtprobit lifeinsurance btot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 3: xtlogit lifeinsurance btot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.spaar1grouped i.spaar2grouped i.spaar4grouped i.spaar5grouped i.spaar6grouped i.spending i.moneyaside i.payingpin

Regression 4: xtprobit lifeinsurance btot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.spaar1grouped i.spaar2grouped i.spaar4grouped i.spaar5grouped i.spaar6grouped i.spending i.moneyaside i.pin1 i.payingpin

Regression 5: xtlogit lifeinsurance btot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.moneyaside i.payingpin i.contactless

Regression 6: xtprobit lifeinsurance btot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin i.contactless

Table 3 Logit regressions full results using total gross income as independent variable

	(1)	(3)	(5)
lifeinsurance	Model 1	Model 2	Model 3
btot	1.30e-05*	2.81e-05***	2.06e-05
	(7.69e-06)	(9.55e-06)	(2.06e-05)
year	-0.0426	-0.0511*	-0.364
	(0.0284)	(0.0270)	(0.371)
age	-0.00467	0.00322	0.187***
	(0.0138)	(0.0128)	(0.0410)
2.geslacht	-0.731	-1.968***	-0.687
	(0.448)	(0.381)	(0.998)
1.headhh	0.132	-0.125	0.257
	(0.474)	(0.420)	(1.027)
1.university	0.0648	-0.317	0.605
	(0.531)	(0.487)	(0.993)
1.government	-0.504	-0.373	-56.44***
	(0.503)	(0.450)	(2.342)
2.government	-1.079**	-1.113***	-2.797**
	(0.426)	(0.408)	(1.171)
aantalki	0.134	0.0349	0.0168
	(0.171)	(0.152)	(0.457)
1.urbanization	-0.360	-0.314	-0.916
	(0.353)	(0.298)	(0.823)
1.married	0.0288	-0.344	0.138
	(0.409)	(0.340)	(0.980)
2.inknorm	-0.0234	-0.150	0.504
	(0.612)	(0.592)	(2.624)
3.inknorm	0.287	0.221	-0.595
	(1.110)	(1.114)	(3.891)
2.reasonable	-0.276	-0.324	1.747
	(0.691)	(0.670)	(7.029)
3.reasonable	-0.294	-0.277	-0.351
	(0.381)	(0.381)	(0.911)
2.opzij	-0.128	-0.105	-0.240
	(0.339)	(0.339)	(0.935)
2.futuresave	-0.240	-0.331	-19.84***
	(0.723)	(0.702)	(4.365)
3.futuresave	-0.143	-0.137	-0.822
	(0.401)	(0.408)	(1.019)
2.spaar1grouped		-0.0561	
		(0.461)	
3.spaar1grouped		0.195	
		(0.379)	
2.spaar2grouped		-0.325	
		(0.412)	
3.spaar2grouped		-0.621**	
		(0.316)	
2.spaar4grouped		-0.0112	
		(0.546)	
3.spaar4grouped		-0.00149	
		(0.494)	
2.spaar5grouped		0.134	
		(0.328)	

3.spaar5grouped		0.159	
		(0.365)	
2.spaar6grouped		0.0609	
		(0.360)	
3.spaar6grouped		0.350	
		(0.433)	
2.spending		0.0674	-0.482
		(0.475)	(1.537)
3.spending		0.0582	-0.155
		(0.429)	(1.366)
1.moneyaside		-0.0477	0.172
		(0.269)	(0.768)
1.payingpin	0.148	0.0891	0.826
	(0.381)	(0.347)	(1.262)
2.contactless			-0.614
			(0.949)
3.contactless			-0.876
			(0.955)
Constant	73.04	92.37*	708.4
	(56.98)	(54.19)	(748.5)
Observations	22,329	21,639	3,602
Number of individualnumber	5,151	5,017	1,858

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

Table 4 Probit regressions full results using total gross income as independent variable

	(1)	(2)	(3)
lifeinsurance	Model 2	Model 4	Model 6
btot	1.19e-05***	1.19e-05***	1.22e-05
	(2.79e-06)	(3.36e-06)	(8.23e-06)
year	-0.0452***	-0.0441***	-0.0419
	(0.0112)	(0.0112)	(0.101)
age	0.0373***	0.0366***	0.0819***
	(0.00556)	(0.00552)	(0.0168)
2.geslacht	-1.005***	-1.020***	-0.252
	(0.237)	(0.217)	(0.301)
1.headhh	0.489**	0.480**	0.307
	(0.213)	(0.199)	(0.340)
1.university	0.316	0.141	0.298
	(0.230)	(0.208)	(0.427)
1.government	-0.176	-0.154	-0.607
	(0.225)	(0.211)	(0.450)
2.government	-0.601***	-0.630***	-1.525***
	(0.180)	(0.173)	(0.476)
aantalki	0.125	0.122*	0.171
	(0.0763)	(0.0702)	(0.154)
1.urbanization	-0.281*	-0.235	-0.158
	(0.166)	(0.149)	(0.259)
1.married	0.476**	0.409**	0.193
	(0.202)	(0.183)	(0.297)
2.inknorm	0.115	0.0321	0.0798
	(0.244)	(0.241)	(0.525)
3.inknorm	0.334	0.243	0.0761
	(0.464)	(0.458)	(1.001)
2.reasonable	-0.288	-0.308	-0.0513
	(0.269)	(0.274)	(0.830)
3.reasonable	-0.230	-0.221	0.0793
	(0.153)	(0.149)	(0.300)
2.opzij	-0.0945	-0.0729	-0.286
	(0.137)	(0.133)	(0.307)
2.futuresave	-0.254	-0.268	-0.299
	(0.280)	(0.283)	(0.930)
3.futuresave	-0.128	-0.116	-0.242
	(0.160)	(0.157)	(0.363)
2.spaar1grouped		0.0418	
		(0.174)	
3.spaar1grouped		0.218	
		(0.146)	
2.spaar2grouped		-0.266	
		(0.164)	
3.spaar2grouped		-0.423***	
		(0.128)	
2.spaar4grouped		0.150	
		(0.209)	
3.spaar4grouped		0.187	
		(0.191)	
2.spaar5grouped		0.113	
		(0.129)	
3.spaar5grouped		0.119	
		(0.143)	

2.spaar6grouped		0.0840	
		(0.139)	
3.spaar6grouped		0.300*	
		(0.170)	
2.spending		0.119	-0.337
		(0.200)	(0.472)
3.spending		0.244	-0.211
		(0.187)	(0.424)
1.moneyaside		-0.0756	0.0268
		(0.112)	(0.232)
1.payingpin	0.174	0.180	0.396
	(0.153)	(0.146)	(0.368)
2.contactless			-0.106
			(0.276)
3.contactless			-0.337
			(0.286)
Constant	85.89***	83.51***	74.51
	(22.51)	(22.50)	(204.2)
Observations	22,329	21,639	3,602
Number of individualnumber	5,151	5,017	1,858

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

List of regressions using net income as independent variable

Regression 1: xtlogit lifeinsurance ntot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 2: xtprobit lifeinsurance ntot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 3: xtlogit lifeinsurance ntot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.spaar1grouped i.spaar2grouped i.spaar4grouped i.spaar5grouped i.spaar6grouped i.spending i.moneyaside i.pin1 i.payingpin

Regression 4: xtprobit lifeinsurance ntot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.spaar1grouped i.spaar2grouped i.spaar4grouped i.spaar5grouped i.spaar6grouped i.spending i.moneyaside i.pin1 i.payingpin

Regression 5: xtlogit lifeinsurance ntot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin i.contactless

Regression 6: xtprobit lifeinsurance ntot year age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin i.contactless

Table 5 Logit regressions full results using total net income as independent variable

	(1)	(2)	(3)
lifeinsurance	Model 1	Model 3	Model 5
ntot	-2.79e-07	2.27e-06	1.06e-05*
	(5.98e-06)	(5.23e-06)	(6.27e-06)
year	-0.0506**	-0.0488*	-0.437**
	(0.0249)	(0.0279)	(0.191)
age	0.0235*	0.0231*	0.285***
	(0.0121)	(0.0130)	(0.0252)
2.geslacht	-0.177	-0.469	-0.642
	(0.358)	(0.376)	(0.455)
1.headhh	-1.121***	-0.323	2.523***
	(0.389)	(0.408)	(0.535)
1.university	-0.820*	-0.612	1.891***
	(0.490)	(0.525)	(0.660)
1.government	-0.221	-0.203	-0.576
	(0.431)	(0.464)	(0.703)
2.government	-1.090***	-0.909**	-4.146***
	(0.369)	(0.391)	(0.615)
aantalki	0.0845	0.157	0.588***
	(0.151)	(0.168)	(0.217)
1.urbanization	-0.290	-0.128	-0.269
	(0.302)	(0.312)	(0.387)
1.married	0.0522	-0.102	1.362***
	(0.349)	(0.362)	(0.477)
2.inknorm	-0.0251	-0.0200	0.734
	(0.560)	(0.615)	(0.804)
3.inknorm	0.384	0.255	0.167
	(1.007)	(1.158)	(1.670)
2.reasonable	-0.174	-0.118	0.239
	(0.607)	(0.696)	(1.765)
3.reasonable	-0.309	-0.184	-0.0903
	(0.352)	(0.390)	(0.474)
2.opzij	-0.153	-0.0544	-0.943*
	(0.312)	(0.348)	(0.506)
2.futuresave	-0.140	-0.169	-0.885
	(0.629)	(0.728)	(2.629)
3.futuresave	-0.199	-0.127	-1.032*
	(0.376)	(0.420)	(0.592)
2.spaar1grouped		-0.0865	
		(0.473)	
3.spaar1grouped		0.203	
		(0.391)	
2.spaar2grouped		-0.301	
		(0.420)	
3.spaar2grouped		-0.479	
		(0.326)	
2.spaar4grouped		0.0577	
		(0.559)	
3.spaar4grouped		0.0953	
		(0.505)	
2.spaar5grouped		0.171	
		(0.335)	
3.spaar5grouped		0.159	
		(0.376)	

2.spaar6grouped		0.118	
		(0.365)	
3.spaar6grouped		0.230	
		(0.454)	
2.spending		0.231	-0.962
		(0.494)	(0.778)
3.spending		0.219	-0.742
		(0.447)	(0.676)
1.moneyaside		0.00196	0.253
		(0.276)	(0.381)
1.payingpin	0.140	0.135	1.425**
	(0.331)	(0.357)	(0.554)
2.contactless			0.331
			(0.485)
3.contactless			0.0862
			(0.469)
Constant	92.75*	86.77	856.9**
	(50.08)	(55.98)	(383.8)
Observations	19,441	18,853	2,997
Number of individualnumber	4,734	4,619	1,624

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

Table 6 Probit regressions full results using total net income as independent variable

	(1)	(2)	(3)
lifeinsurance	Model 2	Model 4	Model 5
ntot	5.49e-06**	4.77e-06**	1.74e-05**
	(2.24e-06)	(2.28e-06)	(8.26e-06)
year	-0.0428***	-0.0406***	-0.107
	(0.0105)	(0.0108)	(0.104)
age	0.0355***	0.0337***	0.120***
	(0.00510)	(0.00533)	(0.0108)
2.geslacht	-1.428***	-1.300***	-0.427
	(0.200)	(0.204)	(0.272)
1.headhh	0.566***	0.605***	0.678**
	(0.195)	(0.193)	(0.294)
1.university	0.350*	0.231	0.605
	(0.181)	(0.179)	(0.427)
1.government	-0.116	-0.0920	-0.424
	(0.196)	(0.197)	(0.431)
2.government	-0.669***	-0.653***	-1.673***
	(0.154)	(0.158)	(0.359)
aantalki	0.121*	0.109	0.200
	(0.0672)	(0.0669)	(0.143)
1.urbanization	-0.256*	-0.226*	-0.194
	(0.132)	(0.133)	(0.229)
1.married	0.344**	0.334**	0.428
	(0.165)	(0.158)	(0.285)
2.inknorm	0.118	0.0454	-0.000778
	(0.228)	(0.239)	(0.455)
3.inknorm	0.377	0.302	0.169
	(0.442)	(0.468)	(0.946)
2.reasonable	-0.226	-0.206	0.633
	(0.258)	(0.265)	(0.965)
3.reasonable	-0.254*	-0.232	-0.0366
	(0.141)	(0.144)	(0.293)
2.opzij	-0.123	-0.0888	-0.457
	(0.126)	(0.129)	(0.283)
2.futuresave	-0.189	-0.204	-0.779
	(0.265)	(0.271)	(0.998)
3.futuresave	-0.152	-0.127	-0.306
	(0.150)	(0.153)	(0.342)
2.spaar1grouped		-0.0335	
		(0.172)	
3.spaar1grouped		0.180	
		(0.142)	
2.spaar2grouped		-0.289*	
		(0.158)	
3.spaar2grouped		-0.435***	
		(0.123)	
2.spaar4grouped		0.119	
		(0.205)	
3.spaar4grouped		0.187	
		(0.186)	
2.spaar5grouped		0.128	
		(0.127)	

3.spaar5grouped		0.137	
		(0.139)	
2.spaar6grouped		0.120	
		(0.136)	
3.spaar6grouped		0.263	
		(0.164)	
2.spending		0.139	-0.213
		(0.196)	(0.430)
3.spending		0.290	-0.247
		(0.180)	(0.384)
1.moneyaside		-0.0796	0.0190
		(0.107)	(0.218)
1.payingpin	0.166	0.167	0.457
	(0.136)	(0.138)	(0.349)
2.contactless			-0.0326
			(0.285)
3.contactless			-0.270
			(0.273)
Constant	81.79***	77.16***	203.3
	(21.02)	(21.70)	(210.5)
Observations	19,441	18,853	2,997
Number of individualnumber	4,734	4,619	1,624

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

Table 7 AIC and BIC values for the different models

	AIC	BIC	Preferred model (pair-wise comparison)
Regression 1 (wealth)	5211.366	5376.466	Regression 1
Regression 2 (wealth)	5664.522	5829.621	Regression 1
Regression 3 (wealth)	4847.889	5113.918	Regression 3
Regression 4 (wealth)	5531.870	5797.899	Regression 3
Regression 5 (wealth)	1498.425	1657.202	Regression 5
Regression 6 (wealth)	1905.778	2064.556	Regression 5
Regression 1 (btot)	5845.944	6014.231	Regression 1
Regression 2 (btot)	6521.264	6689.551	Regression 1
Regression 3 (btot)	5817.756	6089.153	Regression 3
Regression 4 (btot)	6411.254	6682.65	Regression 3
Regression 5 (btot)	1949.150	2110.070	Regression 5
Regression 6 (btot)	2075.872	2236.792	Regression 5
Regression 1 (ntot)	5707.860	5873.238	Regression 1
Regression 2 (ntot)	6031.481	6196.859	Regression 1
Regression 3 (ntot)	5471.200	5737.911	Regression 3
Regression 4 (ntot)	5929.057	6195.768	Regression 3
Regression 5 (ntot)	1375.167	1531.306	Regression 5
Regression 6 (ntot)	1752.782	1908.921	Regression 5

Table 8 Marginal effects for statistically significant variables in logit regressions (wealth)

lifeinsurance	Model 1	Model 5
wealth		5.28e-08**
		(2.39e-08)
year	-0.001331*	
	(0.0007565)	
age		0.0092173***
		(0.0007868)
2.geslacht		
1.headhh		0.0800987***
		(0.0225498)
1.university		
2.government	-0.0292874***	-0.0979196***
	(0.0106791)	(0.0197693)
aantalki		0.0270662***
		(0.0100213)
2.inknorm		0.0752775***
		(0.0265356)
3.spaar2grouped		
3.contactless		-0.0379488**
		(0.0188285)
Control variables added: yes (see Table 1 Appendix 2)		

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

Table 9 Marginal effects for statistically significant variables in logit regressions (btot)

lifeinsurance	Model 1	Model 3	Model 5
btot	8.25e-08	4.77e-07**	5.25e-07
	(9.67e-08)	(2.14e-07)	(5.88e-07)
year		-0.0008686*	
		(0.0004894)	
age			0.0047788***
			(0.0010265)
2.geslacht		-0.0239022***	
		(0.0060479)	
1.government			-0.3875144***
			(0.0233305)
2.government	-0.0057822**	-0.0170023***	-0.0742375***
	(0.002594)	(0.006637)	(0.0258426)
2.futuresave			-0.2147455***
			(0.0234407)
3.spaar2grouped		-0.0107858*	
		(0.0059933)	
Control variables added: yes			

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

Table 10 Marginal effects for statistically significant variables in logit regressions (ntot)

lifeinsurance	Model 1	Model 3	Model 5
ntot			3.34e-07*
			(2.01e-07)
year	-0.0017183*	-0.00086	-0.0137547**
	(0.0008911)	(0.0005373)	(0.0058502)
age	0.000798*	0.0004073	0.008973***
	(0.0004351)	(0.0002574)	(0.0006441)
1.headhh	-0.0435879**		0.0822628***
	(0.0183355)		(0.0163836)
1.university	-0.0224668**		0.0602349***
	(0.0113259)		(0.0204188)
2.government	-0.0359641***	-0.0153281**	-0.1167546***
	(0.0132024)	(0.0076543)	(0.0153942)
aantalki			0.0184786***
			(0.0068178)
1.married			0.0437462***
			(0.014901)
2.opzij			-0.0294651*
			(0.0156282)
3.futuresave			-0.0321777*
			(0.0180943)
1.payingpin			0.0444607***
			(0.0166037)
Control variables added: yes			

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

Appendix 3

List of regressions using logit

Regression 7: xtlogit lifeinsurance wealth d2008 d2009 d2010 age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 8: xtlogit lifeinsurance btot d2008 d2009 d2010 age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 9: xtlogit lifeinsurance ntot d2008 d2009 d2010 age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

List of regressions using probit

Regression 7: xtprobit lifeinsurance wealth d2008 d2009 d2010 age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 8: xtprobit lifeinsurance btot d2008 d2009 d2010 age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Regression 9: xtprobit lifeinsurance ntot d2008 d2009 d2010 age i.geslacht i.headhh i.university i.government aantalki i.urbanization i.married i.inknorm i.reasonable i.opzij i.futuresave i.payingpin

Table 1 Logit regressions to assess the effect per year in 2008, 2009 and 2010

lifeinsurance	Model 7	Model 8	Model 9
wealth	1.18e-09		
	(2.58e-08)		
d2008	0.219	0.207	0.0870
	(0.593)	(0.563)	(0.902)
d2009	0.308	0.228	0.159
	(0.634)	(0.588)	(0.850)
d2010	0.235	0.188	-0.0231
	(0.590)	(0.578)	(0.888)
age	-0.0100	0.0148	-0.0112
	(0.0131)	(0.0139)	(0.0185)
2.geslacht	0.181	-1.003**	-5.199***
	(0.354)	(0.414)	(0.494)
1.headhh	0.0771	0.106	0.0736
	(0.495)	(0.460)	(0.539)
1.university	-0.352	-0.159	0.473
	(0.506)	(0.554)	(0.552)
1.government	-0.102	-0.343	-0.937
	(0.470)	(0.506)	(0.619)
2.government	-0.865**	-1.055**	-1.848***
	(0.407)	(0.433)	(0.545)
aantalki	-0.0528	0.172	-0.826***
	(0.186)	(0.188)	(0.212)
1.urbanization	0.0303	-0.480	-1.736***
	(0.308)	(0.358)	(0.394)
1.married	0.0575	-0.667	-2.180***
	(0.354)	(0.416)	(0.468)
2.inknorm	0.331	-0.0942	-1.253
	(0.587)	(0.622)	(0.965)
3.inknorm	0.753	0.219	-0.846
	(1.133)	(1.178)	(1.898)
2.reasonable	-0.272	-0.202	-0.124
	(0.711)	(0.728)	(1.111)
3.reasonable	-0.234	-0.386	-0.457
	(0.392)	(0.407)	(0.553)
2.opzij	-0.264	-0.188	-0.500
	(0.353)	(0.364)	(0.503)
2.futuresave	0.332	-0.200	-0.299
	(0.705)	(0.755)	(1.093)
3.futuresave	-0.103	-0.184	-0.178
	(0.426)	(0.435)	(0.607)
1.payingpin	0.0940	-0.00545	-1.413***
	(0.350)	(0.383)	(0.511)
btot		2.24e-05***	
		(6.36e-06)	
ntot			6.97e-06
			(6.97e-06)
Constant	-10.76***	-13.20***	-14.32***
	(1.060)	(1.065)	(1.496)
Observations	19,185	22,329	19,441
Number of individualnumber	4,329	5,151	4,734

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

Table 2 Probit regressions to assess the effect per year in 2008, 2009 and 2010

lifeinsurance	Model 7	Model 8	Model 9
wealth	1.92e-09		
	(6.93e-09)		
d2008	0.248	0.245	0.237
	(0.204)	(0.208)	(0.204)
d2009	0.317	0.282	0.291
	(0.219)	(0.218)	(0.206)
d2010	0.201	0.165	0.157
	(0.207)	(0.213)	(0.205)
age	0.0395***	0.0321***	0.0302***
	(0.00493)	(0.00530)	(0.00502)
2.geslacht	-1.536***	-1.058***	-1.435***
	(0.204)	(0.223)	(0.199)
1.headhh	0.443*	0.489**	0.571***
	(0.239)	(0.204)	(0.191)
1.university	0.349**	0.257	0.320*
	(0.154)	(0.216)	(0.179)
1.government	-0.224	-0.125	-0.0601
	(0.183)	(0.213)	(0.190)
2.government	-0.912***	-0.578***	-0.626***
	(0.145)	(0.169)	(0.151)
aantalki	0.153**	0.122*	0.116*
	(0.0609)	(0.0714)	(0.0657)
1.urbanization	-0.235**	-0.258*	-0.242*
	(0.116)	(0.155)	(0.130)
1.married	0.362**	0.518***	0.401**
	(0.143)	(0.192)	(0.164)
2.inknorm	0.265	0.123	0.130
	(0.212)	(0.234)	(0.223)
3.inknorm	0.683*	0.323	0.378
	(0.414)	(0.449)	(0.438)
2.reasonable	-0.236	-0.200	-0.131
	(0.254)	(0.263)	(0.255)
3.reasonable	-0.242*	-0.268*	-0.288**
	(0.134)	(0.149)	(0.140)
2.opzij	-0.179	-0.0948	-0.123
	(0.121)	(0.132)	(0.126)
2.futuresave	0.164	-0.106	-0.0561
	(0.258)	(0.269)	(0.260)
3.futuresave	-0.0706	-0.127	-0.140
	(0.144)	(0.156)	(0.150)
1.payingpin	0.0994	0.106	0.0850
	(0.123)	(0.145)	(0.132)
btot		1.21e-05***	
		(2.86e-06)	
ntot			5.94e-06***
			(2.25e-06)
Constant	-4.177***	-4.749***	-4.059***
	(0.431)	(0.464)	(0.437)
Observations	19,185	22,329	19,441
Number of individualnumber	4,329	5,151	4,734

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

Table 3 AIC and BIC values for the different models

	AIC	BIC	Preferred model (pair-wise comparison)
Regression 7(logit)	5204.451	5385.275	Regression 1 (logit)
Regression 8(logit)	5803.630	5987.944	Regression 2 (logit)
Regression 9(logit)	4952.349	5133.478	Regression 3 (logit)
Regression 7(probit)	5678.495	5859.318	Regression 1 (logit)
Regression 8(probit)	6542.681	6726.995	Regression 2 (logit)
Regression 9(probit)	6045.982	6227.11	Regression 3 (logit)

Table 4 Z-values for dummy variables of years in the abovementioned logit regressions

	Wealth	Btot	Ntot
d2008	1.22	1.16	1.18
d2009	1.44	1.41	1.30
d2010	0.97	0.77	0.77