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Keywords
Risk attitude, ageing, health status, life-related events, SHARE.

JEL Codes
D90, D91, D81.

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Changing Risk Preferences at Older Ages

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January 15, 2019

Abstract

This paper investigates risk preference at older ages in 14 European countries. Older individuals report greater risk aversion. Using the longitudinal nature of the data we are able to show that this relationship between risk preferences and age is not due to cohort effects or selective mortality. We also show, however, that on average roughly forty percent of this overall age effect is actually due to life-events such as retirement, health shocks and widowhood or marital change that occur increasingly as individuals age. These life-events are a particularly important explanation of the age 'effect' for women and for the age group 50-64.

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1 Introduction

Individual attitudes towards risk shape a broad set of decisions relating to important outcomes such as savings and investments, occupational choice and labour supply, retirement decisions, insurance and health services purchase, health behaviours and lifestyles. As a consequence, the study of the determinants of risk attitudes has attracted a great deal of attention in the economic literature. Amongst the findings of the literature to date it has been shown that richer people display on average a lower degree of risk aversion ([Shaw, 1996]) and risk attitudes appear to be influenced also by other factors including personality traits [Bucciol and Zarri, 2017], language structure [Chen, 2013] and education (Riley and Chow [1992], Kapteyn and Teppa [2011] and Outreville [2013]).

Given this background, the way that risk attitudes might evolve over the life-cycle is an important topic for research — the majority of theoretical models assume that risk preferences are time invariant but such a view has been challenged by the empirical literature which shows that risk preferences may vary substantially over the life-cycle (Chuang and Schechter [2015] and Schildberg-Hörisch [2018]). In addition, Dohmen et al. [2011] have shown that, as individuals get older, they are less willing to take financial risks, and subsequent work (Bonsang and Dohmen [2015]) argues that such changes in risk attitude might occur via the cognitive decline that happens at older ages. Our study takes these results as a starting point and investigates the change in risk preferences at older ages in more detail. Understanding the evolution of risk preferences in the latter part of the life-cycle is also particularly important for policy. With increasing shares of individuals entering older cohorts due to population ageing, knowledge of the risk preferences of older cohorts is essential information for the successful design of important welfare programs such as pension schemes, long-term care coverage and health care provision to the elderly, or for broader policy interventions related to annuity or insurance markets.

Ageing is associated with a number of concurrent processes in multiple dimensions that likely affect risk attitudes, and the specific contribution of each of these should be accurately assessed. Retirement, changes in household composition and family ties, psychological and emotional alterations, and the loss of cognitive ability may all contribute to reshape risk preferences. In addition to these factors, a major role is also potentially played by health deterioration, which is a distinctive feature of the ageing process. Health deterioration is partly due to a slow, physiological erosion of the health capital, but in many circumstances, it can be also greatly affected by large unanticipated shocks such as a trauma or a diagnosis of a chronic condition.

In this paper we use data from the Survey of Health Ageing and Retirement in Europe (SHARE) which contains longitudinal measures of self-reported risk aversion on roughly 28,000 individuals aged 50+ in 14 different countries. SHARE also contains detailed measurements of other aspects of the respondents' life-course trajectories such as family circumstances, employment and pension arrangements, cognitive function, personality and a large battery of questions on health and health events. With such data we are able to set up a sequence of empirical models to describe and investigate the way in which risk attitudes change with age. Firstly, since our data are longitudinal, we are able to show that the observed increase in risk aversion that occur with age is not just a cross-sectional phenomenon that may be a result of cohort effects or the fact that people with systematically different risk preferences are more likely to survive until older ages — a panel data model with random effects (and additional controls for country, gender and age) still shows an important and significant role for age.

Following on from this we investigate the degree to which this overall raw age 'effect' may be actually due to the kind of life-events that increasingly happen to older individuals as they age. Consistent with previous literature, our panel data specification with controls for individual heterogeneity also finds a role for income changes and for cognition changes in explaining risk preferences. But our main contribution is to also find and document an important role for other life-events such as widowhood, leaving work, drawing a pension, and health, and show that our finding of the effects of health events on risk aversion is robust to a number of different ways of measuring such events. Taken together, when we add controls for all these events to our models, they can, on average, explain roughly 40% percent of the previously identified age 'effect'. Nevertheless, we still find a statistically significant residual, or 'pure', age effect when all these controls are added.

With such a large sample we are able to carry out sub sample analysis, to investigate the sensitivity or robustness of our results but also to consider potentially heterogeneous effect of life-events and age on risk preferences. We focus particularly on two breakdowns, namely younger and older groups (50–64 as opposed to 65–75) and male/female, and find that life-events matter for the risk preferences of all groups. The age effect itself, and the degree to which age effects are attenuated by controlling for life-events, is different across groups however. We find a strong effect of age for men which is not attenuated at all by controls for life-events. In contrast we find a much greater attenuation of the age effect for women, such that the pure age effect in risk preferences is considerably lower for women than for men and in general not statistically significant. When looking across age groups, we find similar degrees of attenuation, but a much smaller age effect within the older group of our sample. Finally, a number of other specifications and analyses assess the sensitivity and robustness of our results.

The rest of the paper proceeds as follows: section 2 describes the existing literature, section 3 presents the dataset and its variables, section 4 provides descriptive statistics, section 5 the identification strategy and results. Section 6 looks at sensitivity analysis, finally section 7 concludes.

2 Literature Review

Standard life-cycle models assume that risk preferences do not vary at different stages of life, thus implying that attitude towards risk remains stable over time (Pratt [1964], Arrow [1971], Stigler and Becker [1977]). From a theoretical point of view, prospect theory has disputed such hypothesis on the grounds that individuals exhibit different risk preferences when the same choice is presented in different frameworks [Kahneman and Tversky, 1979]. Moreover, individuals weight losses and gains with different probabilities, displaying different degrees of risk tolerance.

In addition, challenges to the stability hypothesis come also from the empirical literature, where experiment-based studies find variability of risk preferences over time. Applied works consistently show that risk preferences tend to change not only over time but also according to the different domains considered [Dohmen et al., 2016]. In order to shed light on the process underlying a wide range of economically relevant choices, a great effort has been devoted for assessing drivers and intensity of changes in risk preferences. To identify the factors that may induce shifts in the preference structure, either studies have exploited idiosyncratic (changes in income, cognition, education, etc...) or exogenous shocks (civil wars, natural disasters, etc...). This notwithstanding, no consensus has been reached on the key factors that contribute to shape risk preferences.

A relevant issue in this debate concerns the way risk attitude is measured. Preference elicitation is based either on consumer choices, or on stated preferences. However, elicited risk attitude based on individual statements has been found to have good predictive power for household's choices (Guiso et al. [1996], Guiso and Paiella [2005]). The available evidence indicates that risk preferences vary across agents and stated preferences are consistent with individual behaviour. For example, individuals with high risk aversion, are less likely to be self-employed or to hold risky securities.

Most contributions have focused on the relationship between individual characteristics and attitude towards risk. The empirical evidence about the association between risk aversion and education is mixed. Some works find a negative correlation between years of education and aversion to risk (Riley and Chow [1992], Kapteyn and Teppa [2011], and Outreville [2013]), whereas in other cases the relationship appears to be positive (Hersch [1996] and Jianakoplos and Bernasek [1998]). An alternative channel has been identified in intergenerational inheritance. To the extent that parents are able to transmit attitudes to their children, a positive correlation between parents and children risk aversion can be expected. Using stated preferences measures, Dohmen et al. [2012] show that attitudes towards risk and trust are passed across generations, suggesting that transmission of family values encompasses various dimensions of economic and social interactions.

More recently Bucciol and Zarri [2017] and Jones et al. [2018] have stressed also the role of personality traits in financial choices. They argue that personal characteristics such as agreeableness, anxiety and cynical hostility are negatively correlated with the chance of taking risks. According to Chen [2013], the structure of the language spoken can be a good predictor of behavioural choices and willingness to take risk. He classifies different languages according to the use of future tense and divides them into strong and weak future time-oriented languages. Individuals belonging to the second group (weak) tend to be more prudent, implying that they save relatively more, smoke less and are wealthier in general.

A different approach has focused on the link between exogenous shocks and risk preferences. These contributions study the effect of events such as financial crises, conflicts (riots, wars) or natural catastrophes (e.g. earthquakes, floods, hurricanes etc..). Regarding financial crises, Bucciol and Miniaci [2018] find that background macroeconomic conditions and personal exposure affect propensity to take financial risk. In particular risk tolerance drops when investors enter a recession. The results are in line with Guiso et al. [2018] who highlight that, after the crisis, investors appear significantly more reluctant to take financial risk than before. The shift is not associated with the actual loss they incurred in, but it is rather due to fear and changes in perception. The evidence of correlation with changes in emotions is consistent with prior research [Necker and Ziegelmeyer, 2016]. Mixed results emerge from the studies about the effects on risk preferences of conflicts as they find both increase [Voors et al., 2012] and decrease (Callen et al. [2014], [Kim and Lee, 2014] and [Moya, 2018]) in risk aversion. Contributions about the effect of natural events are in general inconclusive [Chuang and Schechter, 2015].

The literature has generally found a positive correlation between age and risk aversion. For instance, Dohmen et al. [2011] show that risk seeking attitude declines with age. Younger cohorts seem to be more willing to take risk than older ones, with men being less risk averse than women. Interestingly, the relationship does not appear to be monotonic as the decline in risk attitude reaches a plateau around the age of 65 and remains flat afterwards. Other studies (Gollier [2004], Gollier [2002]) get to similar conclusions and find that younger individuals are on average more willing to take risk. Such evidence can be rationalised bearing in mind that consumers at younger ages enjoy a longer expected lifetime horizon and, therefore, they have more opportunities to smooth consumption, including possible losses. Because of that, they might be prone to accept higher risk when taking financially relevant decisions.

Since the seminal contribution by Grossman [1972], the importance of health status as a component of individual utility function is well rooted in economic theory. Health can increase or decrease the marginal utility of consumption. From the empirical side, Finkelstein et al. [2013] point out the negative effect of health deterioration on the marginal utility to consume, but other scholars such as [Lillard and Weiss, 1997] find a positive effect. The literature has examined also the role of health conditions in increasing precautionary savings, to face expected increases in future health expenditure (Hubbard et al. [1995]) and Palumbo [1999]. Moreover, health deterioration can trigger the demand for early retirement [Disney et al., 2006], as well as disability benefits [Blundell et al., 2002], or reduction in working hours [Trevisan and Zantomio, 2016]. A stream of works has explored the effect of health deterioration on portfolio choice (Rosen and Wu [2004], Edwards [2008], Atella et al. [2012], Bressan et al. [2014]). Overall, they find that declining health conditions increase the ownership of less risky assets, in line with the precautionary savings motive.

Although the impact of health decline has been analysed in the consumption, saving, labour and portfolio choice literature, its role in shaping the underlying risk preferences has not been explicitly addressed yet. In contrast, the assessment of the link between negative health shocks and general attitudes towards financial risk is a key step to identify the pathway whereby the observed change in behaviour comes about. Provided that, moving into the old age, increasingly large cohorts are exposed to negative health shocks, this will give important insights on possible consequences for financially-related decisions that might also translate into sizeable macroeconomic effects.

To the best of our knowledge, the effects of health on risk attitude were first investigated by Hammitt et al. [2009] exploiting a gambling elicitation method. They study the association between income risk tolerance, health and life expectancy on a fairly small sample of individuals from the US (less than 3,000 observations). Their findings point to a positive correlation between health and risk tolerance. More recently, Brooks et al. [2018] use questionnaire data filed by investors meeting their financial advisors to assess the link between ageing and risk attitude. Their study finds a modest influence of age on risk aversion compared to other factors such as retirement or length of the investment horizon. Moreover, cognitive decline does not seem to contribute significantly to explain the lower risk aversion of older investors. Different findings emerge from [Bonsang and Dohmen, 2015] who investigate in detail the role of cognitive abilities, using an indicator that combines numeracy, fluency and memory scores. Based on a single wave of SHARE data, their study documents heterogeneity in risk aversion across age groups, as we do. Yet, according to their findings, the lower willingness of older individuals to take risks can mostly be ascribed to cognitive impairment, while disability or chronic diseases play no significant role.

Previous works linking health changes to risk attitude use a small set of proxies for health status and cross-sectional data. By contrast, our study improves upon the existing literature in that we observe each respondent at different points in time, thus capturing also changes in both risk attitude and health status over time. Moreover, our health measures span over an array of indicators both subjective and objective that account for the multidimensional nature of respondents' health.

3 Data

The data for this study is drawn from the SHARE survey and comprises individuals aged 50+ from fourteen European countries. The sample of respondents is representative at country level. The survey collects a rich array of information on household characteristics, individual attitudes, socio-economic and health conditions. Hence, it has been extensively exploited to study retirement and health care use by older people (Börsch-Supan et al. [2011] and Börsch-Supan et al. [2015]), as well as savings and investment decisions (Christelis et al. [2013], Bucciol et al. [2017]).

Starting in 2004, the survey is conducted every two years through computer assisted interviewing. From the second wave, part of the baseline sample is replaced by new respondents: the panel is therefore composed by 'longitudinal' and 'refresher' individuals. Six waves are available, but only waves 2 (2006/2007), 4 (2011) and 5 (2013)[1]survey serve the purpose of our study. Our analysis exploits a specific question that elicits respondent's attitude towards financial risk. Such question was first introduced in wave 2 and asked again in wave 4, though to new respondents only. The same question was asked in wave 5 to all respondents included in the longitudinal component of the survey. Since our aim is to capture the effect of changes in risk attitude, we restrict our analysis to respondents for whom it was elicited twice. Given the survey design, for each respondent, we record information at either in wave 2 and 5 or in wave 4 and 5[2].

We select individuals who were between 50 to 75 years old at the time of the first interview (wave 2 or wave 4), this to avoid attrition due to death by the time of the second interview (wave 5). Around 25,000 individuals compose our estimating sample.

3.1 The measure of risk attitude

The dependent variable for our empirical analysis is based on the following question:

When people invest their savings they can choose between assets that give low return with little risk to lose money, for instance a bank account or a safe bond, or assets with a high return

[1]Respectively [Börsch-Supan, 2018a], [Börsch-Supan, 2018b] and [Börsch-Supan, 2018c].

[2]Concerning the other waves: wave 1 is excluded since it does not contain information about risk attitude, wave 3 is omitted because it is a retrospective life history survey; finally, wave 6 is ruled out because the question about risk preferences was asked only to new respondents, losing the longitudinal dimension.

but also a higher risk of losing, for instance stocks and shares.

Which of the statements on the card comes closest to the amount of financial risk that you are willing to take when you save or make investments?

1. *Take substantial financial risks expecting to earn substantial returns*
2. *Take above average financial risks expecting to earn above average returns*
3. *Take average financial risks expecting to earn average returns*
4. *Not willing to take any financial risks*

The elicitation method draws upon a well-established question format, included also in the Survey of Consumer Finances[3] and already used in the literature (e.g. Bonsang and Dohmen [2015]). Our measure of risk attitude is considered to be an accurate measure for non experts (face validity), and, as such, valid for eliciting subjective risk attitude. It also shows construct validity, namely, it can be used to appropriately predict a phenomenon [Grable and Lytton, 2001].

Furthermore, we show in Appendix A that this measure of risk attitude is a good predictor of the likelihood of owning financial investments. These features support the relevance and reliability of our measure about financial risk.

In table 1 we present the distribution of responses for each wave separately and for the entire sample.

The answers range from 1 (*willing to take substantial financial risks*) to 4 (*not willing to take any financial risk*), but the large majority of respondents concentrates in category 4 (74.18%) and 3 (21.3%), with only a residual share of individuals displaying above average or substantial willingness to take risks. Because of that, we recode the original scores as a dummy variable, which takes value 1 if the respondent is not willing to take any financial risk (category 4) and 0 otherwise (categories 1, 2 or 3). Consequently, our dependent variable can be interpreted as an indicator of risk aversion.

Table 2 reports responses for risk attitude controlling for being or not the household financial respondent. The question about risk preferences was asked to financial respondents in wave 2 and to new respondents (either financial or not) in wave 4. The available evidence suggests that

[3] See federalreserve.gov/econres/scfindex for more details

financial respondents in wave 2 were slightly less risk averse than those in wave 4. One reason could be that those respondents were interviewed in 2004, prior to the start of the economic crisis.

Figure A illustrates the level of risk attitude across different groups: risk aversion is higher for women (Fig.1); for individuals not living in couple (Fig.2); it is decreasing in the level of education (Fig.3) and increasing in the self-perceived health status (Fig.4).

In table 4, we show the transition probabilities in risk attitude from one wave to the other. The upper panel reports changes from wave 2 to 5: the data shows that 46.29% of respondents who displayed some degree of risk tolerance became risk averse. In the bottom panel, we report transitions from wave 4 to 5, where about 49.56% of respondents witnessed the same change. In contrast, a relatively small percentage of individuals who were initially risk averse increased risk tolerance (19.12% from wave 2 to 5, and 13.94% from wave 4 to 5). As for the agents who did not change their attitude, approximately 50% confirmed to be risk tolerant in both waves (53.76% and 50.44% respectively), while the great majority of those who declared to be risk averse sticked to that attitude (80.88% and 86.06%).

Finally, table 5 reports the probability of transition from a given state to the other for each time span considered. From wave 2 to wave 5, the probability of individuals to become more risk averse is 14.5%, while the same occurred for around 12% of respondents between wave 4 to wave 5. This difference is consistent with the longer time span that separates wave 2 to 5 (6 years) with respect to wave 4 to 5 (2 years).

3.2 Health Measures

Health shocks occurring at older ages have important distinctive features. In particular, despite the treatment provided to patients, they often lead to a permanent deterioration in health status. As a consequence, they can have a deep impact on aspects of life that go beyond the demand of health or long-term care services. Permanent health shocks may influence labour market decisions (e.g. early retirement, reduction in hours worked, etc), affect savings, investments and, more in general, budget planning choices.

Because of this, we examine the health channel as one of the possible drivers of changes in risk attitude and, focusing on respondents above 50, we consider individuals relatively more vulnerable to long-lasting traumas and to the onset of chronic conditions. One of our purposes is to test whether an enduring drop in health status, which increases exposure to future medical costs and reduces earning capacity, makes agents less willing to take risky exposure.

Given its multidimensional nature, the measure of health status is a challenging task in empirical analyses. We take advantage of the rich set of information available in the SHARE dataset and we consider different measures that capture both objective and subjective evaluations of respondent's health. These are: number of acute diseases (*num_disease*); self-perceived health status (*sphus*); minor and major diseases; the health index proposed by Poterba, Venti and Wise (PVW henceforth) [Poterba et al., 2017]. The number of acute diseases is defined as the sum of the illnesses the patient has received a diagnosis of, from the following list: hypertension, heart disease, lung disease, stroke, diabetes, cancer and arthritis. This measure focuses mainly on chronic or very severe conditions and has been largely used in the literature (see [Smith, 1999], Finkelstein et al. [2013], Trevisan and Zantomio [2016], among others). The second indicator (*sphus*) is the standard measure for self-assessed health status, with responses ranging from 1 (excellent), 2 (very good) 3 (good), 4 (fair) to 5 (poor). We convert the scores into a binary variable, that takes value 1 for individuals in '*fair*' or '*poor*' health and 0 otherwise. The third measure is based on the major-minor approach (Smith [2005]). It considers seven acute conditions, but separates major from minor ones. Minor illnesses include diabetes, arthritis, and hypertension, while major ones are stroke, cancer, heart, and lung disease. This approach allow sorting out potential differences in the impact of health changes due to disease severity.

Finally, we compute the PVW index (*hindex*) using principal component analysis, based on up to 20 indicators. Such measure is considered to be among the most comprehensive as it combines information from the other measures, including *sphus* [Kapteyn and Teppa, 2011]. In order to disentangle the effect of subjective evaluation of health in the index, we compute an additional indicator (*hindex1*) that does not exploit information for *sphus*. When we include *hindex1*, the measure for self-perceived health enters the model separately.

3.3 Controls

In order to control for characteristics potentially correlated with risk attitude and health status, we consider a set of additional indicators, most of which measured at the individual or household level. We consider time invariant variables such as the respondent being female and years of education (*yedu*). The empirical literature has generally found that female are more risk averse than men, so that we expect *female* to be positively correlated with risk attitude [Dohmen et al., 2011]. Education is expected to be negatively correlated with risk attitude since more educated people tend to be more risk tolerant [Outreville, 2013].

We also add dummies for countries and respondent 'type', to reflect key aspects of the SHARE questionnaire design that affect our sample structure. Only financial respondents (those who were responding to the wealth and income questions on behalf of their couple) were asked the risk preference questions in SHARE wave 2. In wave 4, all respondents who were being added to the SHARE sample for the first time were asked the risk preference questions. In wave 5 all SHARE respondents were asked the risk preference questions. Thus there are two types of respondent in SHARE with repeated measures of the risk preference. *Type* is coded as 1 if the individual has been interviewed in both wave 2 and wave 5, while 0 corresponds to individuals interviewed in both wave 4 and 5. We expect the coefficients for type to be positive: the interval between the first answer and the second one (wave 5) is longer (6 years) than that for people interviewed in wave 4 (2 years). A larger time span between the first and the second interview possibly increases the probability of observing changes in risk attitude. Moreover, we interact *age* with *type* to capture the potential effect of belonging to one group or the other. Furthermore, the first group (*type*=1) is composed by financial respondents, while the second group (*type*=0) is made of both financial and non-financial respondents, so controlling for *type* we aim at disentangling potential individual characteristics if financial respondents have systematically different preferences from non-financial respondents. Doing so, we also ensure that our age coefficients are flexible enough to allow for differences among these groups and we prevent from confounding effects into other difference such as the health shocks or employment shocks.

We include a quadratic term in age in all our models in order to allow for non linear age effects. Since our sample is all over age 50 we rescale the age term through the formula *age = (age - 50)/10* in order to keep the resulting coefficients easily interpretable. We control also for time varying characteristics such as household size (*hhsize*), marital status and occupational status. More precisely, we include dummies for the respondent being single, widow(er) and being unemployed.

Socio-economic conditions are captured by a measure for permanent income (*pincome*) which adds to household income, also 5% of the net financial household wealth (Finkelstein et al. [2013]). We average permanent income at household level. This measure of income considers not only yearly earnings but also a percentage of net wealth which includes the home value (minus mortgage value if present), household net financial assets and annuities. We expect this measure to be negatively correlated with risk attitude, since wealthier people tend to be more risk tolerant [Shaw, 1996].

We control also for receiving a pension: in one model specification, we use the self-reported information provided in the questionnaire about being retired; but, since there might exist country heterogeneity on the definition of being retired and receiving annuities, to avoid potential measurement error, we create a more accurate measure of pension recipient and we use it in the more general model specification.

Furthermore, the occupational choice is by itself endogenous and as a consequence the retirement one as well (see King [1974] and Paiella and Guiso [2004]). Following Angelini et al. [2009], we exploit institutional information about statutory and early retirement [4], and we build our measure of pension through the following procedure. For each each individual we compute:

$$diffER_{it} = ER_{it} - Age_{it} \tag{1}$$

$$diffSR_{it} = SR_{it} - Age_{it} \tag{2}$$

where ER is early retirement age and SR stands for statutory retirement age.

Each of those variables indicates the number of years left to early and statutory retirement, respectively. First we regress raw indicator for being a pension recipient as obtained from the survey on $diffER$, $diffSR$ and time varying controls

$$Pension = \beta_1 diffER_{it} + \beta_2 diffSR_{it} + \mathbf{\Gamma} X_{it} + u_{it}. \tag{3}$$

Then, following a control function approach (see Wooldridge [2015] for example) we use the predicted probability of retirement as estimated by model (3) as a proxy for being a pension recipient.

This is expected to decrease the chance of being risk averse, since receiving a pension can provide an economic cushion towards risk.

[4] This information is available from ssa.gov/policy

Given the influence of cognitive skills on risk attitude [Christelis et al., 2010], we add a '*numeracy*' indicator taking value 1 if the respondent selects the wrong answer about a question involving a simple calculation, and 0 otherwise. Such measure can thus be interpreted as proxy for poor cognitive skills. We expect numeracy, which is increasing in worse numeracy skill, to increase the aversion towards risk (see Bonsang and Dohmen [2015]).
Finally, we include the measures for respondent's health status illustrated in the previous section.

4 Descriptive Statistics

Table 3 shows summary statistics for the variables of interest for each wave and for the three waves considered jointly.
The original sample has about 56,000 observations but due to missing values on some variables [5], we loose around 8% of the observations and perform the empirical analysis on about 50,000 observations.
Overall, almost 75% of the individuals are risk averse, this being in line with the standard hypothesis that individuals tend to be risk averse on average.
On average individuals are 63 years old. About the gender composition: there are slightly more females in wave 4 (56%) than in wave 2 (53%); overall 55% of the sample is composed by women. The share of married individuals is about 70%, while 11% are widow(er)s, this share reasonably increasing from the first to the second interview. Almost two thirds of respondents declare to be retired and one third is still working.
Regarding numeracy skill, the question was not asked in wave 5, so we duplicate the response given in the first interview. Because of this, the figures likely underestimate the share of individuals facing cognitive impairment in wave 5. On average 13% of respondents failed the question about computing a simple numerical calculation and therefore they are marked with low numeracy skill.
The question about risk attitude was asked in wave 2 only to individuals who stated to be the financial respondent of the household and to all types of respondents in wave 4: this might

[5] The variables affected the most by missing values are *numeracy*, some of the components of the *hindex* and personality traits characteristics.

explain why the average risk aversion is lower in wave 2 than in wave 4. Above all, we control for the potential effect of being the financial respondent through the *type* variable.

With respect to health, on average each individual states to have (almost) one acute disease among cancer, stroke, diabetes, arthritis, hypertension, heart and lung diseases. The number of illnesses increases from the first to the second interview, in line with the health deterioration associated to ageing. On average minor diseases are more frequent than major ones. Most individuals declare to be in good health, while around one third of them claims to be in fair or poor health. Finally, the Poterba-Venti-Wise index, which is increasing in worse health, is about 3 out of 5, with a high standard deviation, meaning that there is quite high variability within the sample.

5 Empirical Strategy and Results

5.1 Empirical Strategy

The outcome variable of interest, the indicator for risk attitude discussed above, is dichotomous and calls for a model specification that accounts for this feature.

To this aim, we consider the following latent data generating process:

$$y^*_{iw} = \boldsymbol{x}_{iw}\boldsymbol{\beta} + \nu_{iw} \qquad i = 1, 2, \ldots, n \qquad w = 1, 2 \tag{4}$$

$$\nu_{iw} = c_i + \varepsilon_{iw} \tag{5}$$

and the outcome process:

$$y_{iw} = 1 \text{ if } y^*_{iw} > 0 \text{ and } 0 \text{ otherwise} \tag{6}$$

where the subscript i denotes the respondent, $w = 1, 2$ indicates the first or the second wave in which the respondent is interviewed, y^*_{iw} is the latent (unobservable) variable, y_{iw} is the observed risk attitude, $\boldsymbol{x}_{iw}$ is a vector of time-invariant and time-varying regressors, $\boldsymbol{\beta}$ is the vector of associated paramenters, c_i is the individual-specific unobserved effect, and ε_{iw} is an idiosyncratic error term.

We assume that the random shock ε_{iw} is normally distributed, i.e. $\varepsilon_{iw} \sim \mathcal{N}(0, \sigma^2_\varepsilon)$, so that the outcome model of interest is an unobserved effects probit model in which the probability of being risk averse is modeled as:

$$\mathrm{P}(y_{iw} = 1|\boldsymbol{x}_{iw}, c_i) = \Phi(\boldsymbol{x}_{iw}\boldsymbol{\beta} + c_i) \tag{7}$$

where Φ is the standardised normal cumulative density function.

A key assumption for unobserved heterogeneity probit models is that the observed regressors are strictly exogenous conditional on the unobserved effect [Wooldridge, 2010], i.e.

$$D(y_{iw}|\boldsymbol{x}_i, c_i) \equiv D(y_{iw}|\boldsymbol{x}_{i1}, \boldsymbol{x}_{i2}, c_i) = D(y_{iw}|\boldsymbol{x}_{iw}, c_i) \qquad w = 1, 2. \tag{8}$$

Following Wooldridge [2010], we consider a random effects probit specification which adds to the strict exogeneity assumption the assumption that, conditional on the observed regressors, the individual specific effects follow a normal distribution:

$$c_i|\boldsymbol{x}_i \sim \mathcal{N}(0, \sigma_c^2). \tag{9}$$

This key assumptions for probit RE implies independence between c_i and $\boldsymbol{x}_i$ and

$$\mathrm{P}(y_{iw} = 1|\boldsymbol{x}_{iw}) = \Phi(\boldsymbol{x}_{iw}\boldsymbol{\beta}_c) \tag{10}$$

where $\boldsymbol{\beta}_c = \frac{\boldsymbol{\beta}}{(1+\sigma_c^2)^{1/2}}$.

It is straightforward to see that when $\sigma_c^2 = 0$, the parameters are the same as the ones of a pooled probit model which overlooks unobserved heterogeneity [6]. The random effects probit model in 10 is estimated by Maximum Likelihood using the `xtprobit, re` command in Stata 15.

The full set of controls includes the covariates listed in the previous section: age, gender, years of education, log of permanent income, the predicted probability of being a pension recipient, indicators for working, married or widow(er) respondents, numeracy, household size and the indicators for the health status. We include a full set of country dummies, Italy being the baseline case, and the control for the waves in which each respondent was interviewed (*type*). We first estimate the model focusing on the age effect, then we add the time-varying controls, and finally we evaluate the effect of different measures of health conditions.

[6] We obtained the full set of pooled probit estimates with standard errors clustered at the respondent level: the estimated coefficients are generally in line with those obtained for the RE specification, both in terms of magnitude and statistical significance. However, the Wald and the LR tests on the random effects pointed to the presence of random unobserved heterogeneity and led us to prefer the RE specification. Pooled probit estimates are available upon request.

5.2 Results

Table 6 displays the results for the model presented in equation (1), reporting coefficients, standard errors and significance at conventional levels, and average marginal effects for the key variables of interest.

A common driver for several control variables included in our analysis is the ageing process, often associated with deterioration in cognitive and physical skills. To account for the possibility that our estimating equation includes correlated regressors, this potentially affecting multiple testing and inference, we adopt the Holm-Bonferroni's correction [Holm, 1979], adjusting the p-values for the coefficients of age, numeracy and health.

Column (I) shows the effect of age on risk attitudes, controlling for time invariant individual characteristics (gender and years of education), country dummies and type of respondent in the random effects probit specification. For the age variable, the marginal effects, reported in the second column (I_AME), result from the joint inclusion of the linear, the squared and the interaction terms to account for non-linear effects. Similarly, for the *type* variable, the marginal effect includes the interaction terms as well.

As for the results in column (I_AME), we find that risk aversion increases with age, with older respondents being significantly more reluctant to take any financial risk. Such evolution of risk preferences over the life-cycle is consonant with prior studies and provides a useful benchmark for quantifying the raw age effect. To give a sense of the magnitude of the estimated effect, getting 10 years older increases the chance of being risk averse by about 5 percentage points, other things equal. We find also that females are 10.6 percentage points more likely to be risk averse than males, while one additional year of education decreases the probability of risk aversion by around 1.6 percentage points. The direction of both effects confirms previous evidence in the literature. Respondent type has a small effect when we take into consideration its interaction with age, even though the sign of the coefficient is positive and in line with expectations.

Finally, we also find evidence of substantial heterogeneity in the level of reported risk aversion across countries. Controlling for such differences is important given that country-specific cultural factors and institutional features might affect risk attitude in general and reactions to health deterioration in particular. Respondents from Sweden and Denmark appear less risk averse compared to the Italians taken as benchmark. Other countries such as Spain, Slovenia and Estonia are instead more risk averse at the baseline with respect to the benchmark.

In column (II) of table 6 we add time-varying controls to capture income changes and life-events, such as household size, log of permanent income and dummy variables for being single, widow(er), unemployed, and pension recipient. In this specification we treat the pension indicator as exogenous and enter the raw information as retrieved from the questionnaire. In column (III) we will use a control function approach to capture the potential endogeneity of the pension status variable, as described above.

The sign and statistical significance of the age effect on risk attitude is in line with the previous specification, but the age effect is attenuated: the predicted increase in the probability of being risk averse is now around 3 percentage points for a decade. Thus, the life events added explain about 40% of the raw age effect estimated in column (I).

As for the impact of socio-economic indicators, our estimates show that permanent income is negatively correlated with risk aversion and being unemployed increases the chance of being risk averse by 2 percentage points. Our findings are consistent with previous research showing that individuals enjoying higher earnings are relatively less reluctant to take financial risk (Shaw [1996] and Paiella and Guiso [2004]). When treated as exogenous, the effect of receiving a pension decreases risk tolerance by 2.4 percentage points, on the contrary, this effect is not significant when we allow for potential endogeneity of the occupational choice and, as a consequence, of the possibly endogenous decision to retire and to draw a pension. In this latter specification, the size of the unemployment status effect and the income effect remain unaffected. The positive impact of being unemployed indicates that lack of regular earnings influences individual attitude towards risk even beyond the pure income effect, consistent with the view that receiving relatively stable income flows which contribute to reduce the volatility of expected earnings provides individuals with an economic cushion that significantly lowers their risk aversion. Finally, becoming widow(er) increases risk aversion, in line with the conjecture that the presence of a partner may act as an informal insurance device in the face of adverse events, while household size displays generally a negligible effect.

We enrich both specifications in columns II and III further by adding an indicator for low numeracy skills, taken as a proxy for cognitive ability. Controlling for deficiencies in cognitive ability is crucial to disentangle the different health channels that might affect risk attitude.While preserving a significant role for age, even our most conservative estimates exhibit a drop in the age effect of about one third when the impact of other factors is accounted for. In particular, since we are interested in assessing the impact of downward jumps in health status such as the onset of new chronic conditions, we need to separately account for the smooth health deterioration due to the progressive loss in cognitive skills associated to ageing. In line with expectations, the sign of the coefficient is positive, indicating that poor cognitive skills are correlated with a reduced propensity to take financial risks. Individuals who fail to respond correctly to the simple calculation task assigned in the survey record a higher probability of being risk averse by about 2.6 percentage points.

Our findings consistently indicate that the ageing process increases risk aversion. However, changes in income and cognition capacity, together with relevant life-related events such as employment status, or the presence of a partner, can explain a substantial part of that increase.

In the next set of models we investigate more in depth the effects of the health deterioration that may also occur with age, using an array of different health measures that can be retrieved from SHARE. Results are reported in Table 7. From column (I) through (V), we include different measures of health: the number of diseases, self-perceived health status, the Poterba-Venti-Wise (PVW) index, the number of major and minor diseases, and the adjusted PVW index, respectively. Most notably, health status is always significant and positively correlated with the dependent variable across all the specifications considered. This implies that health deterioration contributes to increase risk aversion, even after controlling for age, socio-economic status, life-related events and cognitive abilities. To discuss the role of the different health indicators, we refer mainly to the marginal effects reported for each specification. The largest impact is associated to *sphus*. Respondents that evaluate their health status as relatively poor have a probability of being risk averse that is around 4.5 percentage points higher than the reference group. This evidence could suggest that changes in self-perception of health status affect the attitude towards risk relatively more than changes due to more objective events such as newly diagnosed diseases, although one might worry about potential correlations between two subjective responses confounding such an interpretation. Consequently it is also interesting to look at the effects of objectively measured health conditions such as the number of diseases or the index of different health and disability indicators. The estimated health effect comes out as relatively small for most of the individual indicators proposed, but strongly significant for all. If we consider the diagnosis of a new disease, this event increases the probability of being risk averse by 1 percentage point (col. I_AME), while a new minor or major disease (col IV_AME) increases the chance of risk aversion by 1.3 and 1.1 percentage point respectively. As for the PWV index (col. III_AME), a change by about 1.3 percentage points increases the likelihood of being risk adverse. Our results show that self-assessment of health conditions plays a major role among the components of the index, as it is confirmed also by column (V_AME), where the impact of *sphus* is entered separately from the other components of the index.

Importantly, all the effects of the other regressors are preserved in the specification including also the control for health conditions and the single and widow variables are both statistically significant after controlling for health. Most importantly, however, all our conclusions on the age effect on risk aversion, and the degree to which it is attenuated by controlling for other variables that change with age, are unaffected.

6 Further Analysis

In this section we proceed with further analysis to evaluate the robustness of our findings and the degree to which they are driven by particular subgroups within the overall 50–75 sample. We adjust the p-values for the coefficients of potentially correlated variables (age, numeracy, health indicators and personality traits) following the Holm-Bonferroni's correction for multiple testing.

6.1 Age groups

In this section, we attempt to provide further insights on the different factors influencing risk attitude that may depend on whether the respondent is still at a working age or not. To do so, we split the sample between individuals that, at the time of the first interview, are aged 50-64, from those aged 65-75. The choice of the threshold is due to the fact that in most of the countries examined, reaching 65 years of age is the requirement for statutory retirement.
Then, we estimate the same random effects probit model illustrated in previous sections separately for each sub-sample. Table 8 and 9 report coefficients, marginal effects and standard errors for the 50-64 and for the 65-75 groups, respectively. Not surprisingly the age effect is much smaller in size and no longer significant when the two subgroups are considered separately: this drop is due to the smaller range of variation in the age variable in the sub samples.

By contrast, the significance level and the magnitude of the effects associated to all health-related indicators are fairly similar, pointing to a comparable impact of health deterioration across age groups. Most notably, income decreases both groups' risk aversion. Younger cohorts are more affected by receiving a pension and being single.

6.2 Gender analysis

An important issue to consider relates to the link between risk attitude and gender. The literature has consistently pointed out that risk attitudes tend to differ substantially between men and women (Dohmen et al. [2011] and Borghans et al. [2009]), with females usually more reluctant to take risks. Our main specification confirms this empirical regularity.

In order to further investigate possible differences in the determinants of risk aversion across genders, we run separate analyses for men and women. Results are reported in table 10 and 11. It is worth noticing that the impact of age is greater for men than for women. This seems to suggest that ageing is affecting relatively less women's risk attitude and that the age effect for men is not attenuated by life-related events. To give a sense of the magnitude, when controlling for a new disease for example (col (I_AME) in both tables), the effect of age over 10 years is about 5.5 percentage points for males (table 10) and 0.6 percentage points for females (11), this latter effect being not significant.

As for the time varying controls, being a pension recipient only affects female risk attitude, whereas permanent income and education are still negatively correlated with risk aversion for both groups. Not working plays a role only for male respondents, increasing the chance of being risk averse. In line with the estimates on the full sample, risk aversion increases with health deterioration even if we consider the two genders separately. Poor cognitive skills, as proxied by numeracy, positively affect male risk aversion while they have no significant impact on female risk attitude.

6.3 Personality traits effect

Personal characteristics have recently gained attention as factors potentially affecting individual attitude towards risk. The literature on personal traits has focused in particular on the so called

'Big 5': neuroticism, agreeableness, openness to experience, conscientiousness and extroversion. These characteristics are considered to be stable over time [Schildberg-Hörisch, 2018]. According to a stream of the literature on the determinants of risk preferences, they can significantly contribute to shape preferences and potentially play a relevant role in risk taking decisions over financial matters [Bucciol and Zarri, 2017]. In this section, we check whether after including personality traits among the control variables, the main empirical results still hold. To do so, we have built proxies for neuroticism, agreeableness, extroversion and openness to experience using information from the survey. Neuroticism is evaluated from a question asking whether the respondent experiences irritability, sadness or depression; agreeableness relates to participating in voluntary or charity work, helping other individuals or elderly people; extroversion is assessed through sports or being part of social, religious or political groups in the last twelve months. Finally, openness to experience is elicited from a question about attending educational or training courses.

Results from the specification including dummy indicators for the 'Big 5' are reported in Table 12. They provide evidence that age and the other factors previously included still affect significantly risk attitude, even after controlling for personality traits. The influence of the latter on risk attitude is in line with prior findings in the literature for all the components, except for agreeableness. In fact, such indicator is in most other cases negatively correlated with owning stocks. A possible explanation can be that being more open-minded and open to new situations may favour risk tolerance.

6.4 Geographical Pattern

Our final sensitivity analysis assesses whether there are relevant group effects at the country level that may affect individual statements about risk aversion through correlation with other factors, and in particular age. To do so, we create a set of dummies based on the average risk attitude of the different countries. In particular, we classify each country either as 'highly risk averse', 'middle risk averse' or 'risk tolerant' according to where the country average risk aversion locates with respect to the overall distribution. The group of highly risk averse countries comprises Austria, Spain, Italy, Czech Republic, Slovenia and Estonia. Middle risk averse countries include Germany, France, Switzerland, Belgium and Israel. Finally, risk tolerant countries are Sweden, Netherlands and Denmark.

This classification is based on the fact that each of the three groups have a median value of 1 for risk attitude, but highly risk averse countries display a mean value of risk attitude equal to 0.81 (s.d. 0.38), middle risk countries of 0.69 (s.d. 0.46) and risk tolerant countries of 0.55 (s.d. 0.49).

We then run separate regressions, whose outcomes are reported in table 13 where we also interact this group dummy indicator with age, age squared, working and pension variables. We expect that individuals from countries that are more risk tolerant will exhibit less chance of being risk averse, with respect to the others. Estimates in column (III) show that belonging to a risk tolerant country decreases the chance of being risk averse. The magnitude and the significance of the remaining set of covariates are in line with previous results.

7 Conclusion

In this paper, we use survey data to study how risk preferences over financial decisions change at older ages, and we focus on the role of health deterioration in shaping individual attitudes. Our analysis covers respondents from 14 European countries and considers country-representative samples of individuals aged between 50-75. Each agent in our sample is interviewed at successive points in time and their willingness to take financial risks is elicited using a question format based on stated preferences. Given the distribution of individual responses to such question, our dependent variable is constructed as a dichotomous indicator that separates individuals not willing to take any financial risk (around three quarters of the responses) from the rest of respondents.

Our empirical strategy relies on the estimation of probit random effect models, where the dummy indicator for risk aversion is regressed against a rich set of explanatory variables that allow controlling for household demographics and socio-economic respondent characteristics as well as unobserved heterogeneity. Thanks to the rich set of information contained in the questionnaire, also we include alternative measures for respondent's health status, comprising both subjective and objective health indicators, as well as a proxy for cognitive deficiency.

Our findings concerning the impact of age on risk attitude fit with previous results in the literature, as older individuals appear more reluctant to take financial risks than younger respondents do. Yet, the effect comes out as rather small in magnitude once we control for heterogeneity using the repeat measures. Moreover, we found that individuals vary their risk attitude as a consequence of early life-related events such as becoming unemployed or receiving benefits (disability or invalidity pension for example); rather than at later stages of life, when they might stem to a reached level of risk attitude.

In the same vein, also the proxies for socio-economic conditions are in line with expectations and significantly contribute to explain variations in risk attitude. Permanent income or being a worker, they all reduce risk aversion, consistently with the view that a better socio-economic status and regular flows of earnings contribute to make individuals more prone to take financial risks.

Finally, we also address the potential role of health deterioration on risk preferences. Previous works had already stressed the importance of controlling for loss of cognitive abilities in order to properly identify the genuine impact of ageing on individual risk attitudes [Bonsang and Dohmen, 2015]. Our contribution moves a step forward in that we include in the analysis also an array of alternative health indicators, alongside controls for cognitive skills. By doing so, we are able to account not only for the progressive cognitive decline associated to ageing, but also for sudden drops in health status, possibly due to events such as the diagnosis of new diseases or traumas. Throughout the ageing process, such negative shocks have often major and enduring consequences in the life of the elderly and their influence should be accurately accounted for. Our empirical evidence consistently shows that health deterioration significantly increases risk aversion, with the largest impact being produced by worsening in self-perceived health status.

A major strength of the SHARE survey is the rich set of the available information, although it has also limitations that affect our analysis. In addition to the relatively crude nature of the risk preference question, a major limitation is that each individual, for whom the attitude towards risk is elicited, is surveyed in two distinct waves only. Being able to extend the longitudinal dimension, would allow tracking changes in risk attitude at different stages of life more accurately. Moreover, the dataset includes only individuals aged 50 and over. To provide a more comprehensive view of changes in preferences over the life-cycle, it would be especially important to explore also how health shocks affect changes in risk preferences at younger ages, given that the relative importance of the potential drivers of risk preferences may vary substantially. Yet, we are aware of no study having addressed this issue so far.

Finally, our findings concerning the interplay of ageing and health status bear important policy implications. On the one side, our results support the widely held view that risk aversion increases with age. On the other side, we show that worsening in health status, as captured either by self-perceived health or by the onset of new diseases, further strengthens such process. Given that the increase in life expectancy in developed countries is strongly associated with a rising incidence of chronic and severe conditions, policy makers should be aware that average risk aversion is likely to rise among increasingly large and influential segments of the population. This is likely to exert pressures to re-orient public policies in favour of a higher a degree of social protection.

A Appendix A

A.1 Robusteness check on the risk attitude measure

Following Bonsang and Dohmen [2015], we want to estimate whether our measure of risk attitude is a good predictor of financial exposure. Table 14 shows the results. We run a linear probability model.

We create a variable for stock ownership which is 1 if the respondent states to own stocks and 0 otherwise. We use the measure of financial risk attitude as it is presented in the questionnaire with the 4 scores, from not willing to take any financial risk to taking substantial financial risk. We control for age, years of education, being in couple, having a chronic disease and being working or retired. We include the full set of country dummies. In column (I) we include the linear and the squared term for age, while in column (II) we include dummies for age groups.

Results in table 14 suggest that risk attitude is a good predictor of the probability of owning stocks: respondents who state to be willing to take from average to substantial financial risk have higher probability of stock ownership, with respect to those who reply not to be willing to take financial risk. This evidence is in line with the findings of Bonsang and Dohmen [2015].

Table 1: **Distribution of financial risk preferences**

	wave 2		wave 4		wave 5		Total	
Financial risk preferences	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.
1.Take substantial financial risks	125	1.34	173	0.93	269	0.96	567	1.01
2.Take above average financial risks	698	7.45	503	2.70	765	2.73	1966	3.50
3.Take average financial risks	2,110	22.64	3,804	20.41	5,992	21.45	11931	21.3
4.Not willing to take any financial risks	6,392	68.57	14,159	75.96	20,917	74.86	41468	74.18
Total	9,321	100.00	18,639	100.00	27,940	100.00	55900	100.00

Table 2: **Summary statistics for risk attitude**

Variable	Wave 2			Wave 4			Wave 5		
Risk Attitude	0	1	Total	0	1	Total	0	1	Total
Fin Resp									
N	2926	6375	9301	3217	9976	13193	5383	15649	21032
P	31,45%	68,54%	100%	24,38%	75,61%	100%	26,48%	73,51%	100%
Non Fin. Resp									
N	3	17	20	1263	4183	5446	1640	5268	6908
P	15%	85%	100%	23,20%	76,80%	100%	23,50%	76,50%	100%
Tot			9321			18639			27940

NOTE: This table shows prevalence of response (N) and percentage (P) for Risk attitude for Financial Respondents (Fin Resp) and non Financial Respondents (Non Fin Resp) per each wave.

Table 3: **Summary statistics**

Variable	**Stat**	**Wave 2**	**Wave4**	**Wave5**	**Total.**
risk attitude	mean	0.685	0.759	0.748	0.741
	sd	0.464	0.427	0.433	0.437
age	mean	62.025	61.546	65.100	63.403
	sd	6.835	7.155	7.370	7.410
female	mean	0.530	0.564	0.553	0.553
	sd	0.499	0.495	0.497	0.497
married	mean	0.698	0.719	0.691	0.701
	sd	0.459	0.449	0.461	0.457
widow	mean	0.123	0.093	0.124	0.113
	sd	0.328	0.291	0.330	0.317
hhsize	mean	2.193	2.231	2.109	2.164
	sd	1.032	1.013	0.967	0.995
working	mean	0.366	0.374	0.283	0.327
	sd	0.481	0.484	0.450	0.469
retired	mean	0.579	0.586	0.676	0.630
	sd	0.493	0.492	0.467	0.482
yedu	mean	11.547	11.008	11.190	11.189
	sd	4.294	4.282	4.297	4.295
numeracy	mean	0.129	0.141	0.137	0 .137
	sd	0.335	0.348	0.340	0.343
p.income	mean	38536.44	34447.89	35824.53	35830.28
	sd	34043.98	72971.13	62575.31	62568.38
num disease	mean	0.879	0.944	1.126	1.024
	sd	0.954	1.032	1.069	1.043
minor	mean	0.704	0.689	0.903	0.799
	sd	0.784	0.773	0.851	0.821
major	mean	0.185	0.266	0.234	0.236
	sd	0.445	0.538	0.506	0.508
sphus	mean	0.277	0.378	0 .366	0.355
	sd	0.447	0.484	0.481	0.478
hindex	mean	2.750	2.965	3.070	2.981
	sd	1.378	1.427	1.402	1.411
	N	9217	17931	27073	54221

NOTE: This table provides mean and standard deviation (sd) for each variable of interest of the dataset by wave and in total.

Figure 1: Gender

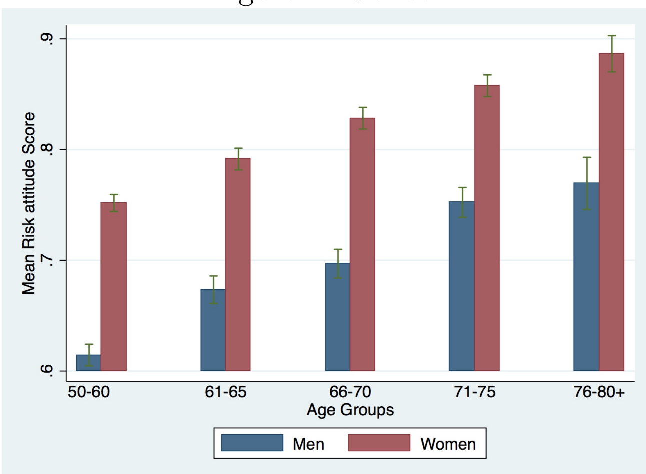


Figure 2: Couple

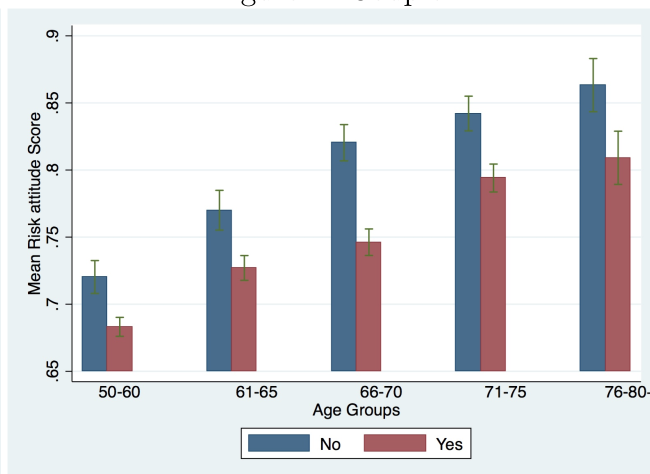


Figure 3: Education:

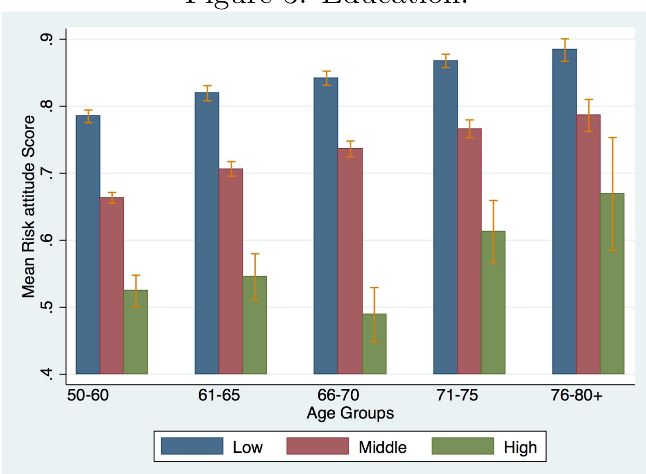
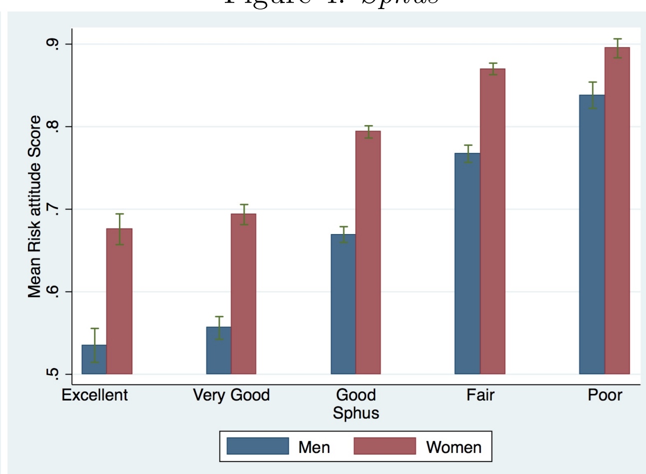


Figure 4: *Sphus*



NOTE: Figures from 1 to 4 show prevalence of risk attitude , according to 4 different specifications: men-women (fig. 1), being in couple or not (fig. 2), education level (fig. 3) and self perceived health status (*sphus*) (fig. 4).

Table 4: **Transition Matrix: changing in risk preferences**

Agents aged 50-75 for W2, 50≥ for W5

	Risk attitude		Total
	0	1	
0	1571	1354	2925
	53.71	46.29	100.00
1	1221	5165	6386
	19.12	80.88	100.00
Total	2792	6519	9311
	29.99	70.01	100.00

Agents aged 50-75 for W4, 50≥ for W5

	Risk attitude		Total
0	2258	2219	4477
	50.44	49.56	100.00
1	1973	12179	14152
	13.94	86.06	100.00
Total	4231	14398	18629
	22.71	77.29	100.00

NOTE: This table provides changes in risk attitude replies. The upper table shows changes from wave 2 to 5, the bottom table presents changes from wave 4 to 5. Rows report responses and percentages for the 1st reply, while columns reports the final prevalence and percentage.

Table 5: **Transition Matrix: changing in risk preferences Agents aged 50-75 for W4, 50≥ for W5**

Panel A

	Wave 2	Wave 4	Wave 5
N	19199	29218	34559
P	72.7%	76.6%	75.0%

Panel B

W2 interviewed also in W5		W4 also interviewed in W5	
N	9311	N	18629
P (w2)	68.6%	P (w4)	75.9%
P (w5)	70.1%	P (w5)	77.2%
p(0,0)	16.9%	p(0,0)	12.1%
p(0,1)	14.5%	p(0,1)	11.9%
p(1,0)	13.1%	p(1,0)	10.6%
p(1,1)	55.5%	p(1,1)	65.4%
Tot. obs with N>1 risk av. q.		27940	

NOTE: **Panel A**: The panel shows overall number of individuals (N) by wave and the respectively percentage (P) of risk averse individuals according to our definition of risk attitude. N refers to the total number of respondents per wave, not necessarily interviewed in more than one waves.
Panel B: The upper table shows the prevalence of risk averse individuals who were interviewed in 2 waves. The bottom table shows the percentage of respondents not changing reply (p(0,0) as well as p(1,1)); the percentage of individuals becoming risk averse (p (0,1)) or becoming risk tolerant (p(1,0)) from the first to the second interviews

Table 6: **Model for financial risk attitude**

Dep: risk_attitude	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)
age	0.292***	0.051***	0.278***	0.031***	0.273***	0.031***
	(0.0758)	(0.0028)	(0.0809)	(0.0041)	(0.0908)	(0.0075)
age^2	-0.022		-0.061*		-0.059*	
	(0.0308)		(0.0320)		(0.0324)	
log_pincome			-0.583***	-0.128***	-0.584***	-0.129***
			(0.0193)	(0.0040)	(0.0200)	(0.0042)
pensiond			0.100***	0.022***		
			(0.0269)	(0.0059)		
pensiond_inst					0.107	0.024
					(0.1445)	(0.0318)
notworking			0.089***	0.020***	0.085	0.019
			(0.0277)	(0.0062)	(0.0784)	(0.0175)
single			-0.126***	-0.028***	-0.127***	-0.028***
			(0.0292)	(0.0065)	(0.0308)	(0.0069)
widow			0.082**	0.018**	0.082**	0.018**
			(0.0379)	(0.0081)	(0.0392)	(0.0084)
hhsize			-0.020*	-0.004*	-0.020*	-0.004*
			(0.0115)	(0.0025)	(0.0116)	(0.0025)
numeracy			0.119***	0.026***	0.120***	0.026***
			(0.0422)	(0.0093)	(0.0423)	(0.0089)
AU	-0.143***		-0.048		-0.048	
	(0.0477)		(0.0497)		(0.0517)	
GER	-0.127*		-0.082		-0.083	
	(0.0714)		(0.0727)		(0.0737)	
SWED	-0.970***		-0.699***		-0.700***	
	(0.0598)		(0.0612)		(0.0646)	
NETH	-0.235***		0.011		0.010	
	(0.0554)		(0.0573)		(0.0584)	
SPAIN	0.615***		0.497***		0.498***	
	(0.0596)		(0.0644)		(0.0647)	
FRA	-0.262***		-0.118**		-0.119**	
	(0.0482)		(0.0507)		(0.0531)	
DEN	-0.928***		-0.701***		-0.701***	
	(0.0566)		(0.0589)		(0.0606)	
SWITZ	-0.536***		0.240***		0.240***	
	(0.0500)		(0.0562)		(0.0563)	
BEL	-0.080		0.166***		0.166***	
	(0.0488)		(0.0515)		(0.0531)	
ISRA	-0.190***		-0.139*		-0.141*	
	(0.0707)		(0.0732)		(0.0754)	
CZECH	-0.250***		-0.876***		-0.878***	
	(0.0477)		(0.0538)		(0.0607)	
SLO	0.400***		0.136**		0.136**	
	(0.0583)		(0.0602)		(0.0631)	
EST	0.764***		0.109**		0.106	
	(0.0494)		(0.0554)		(0.0665)	
female	0.492***	0.106***	0.438***	0.098***	0.439***	0.098***
	(0.0190)	(0.0040)	(0.0198)	(0.0044)	(0.0216)	(0.0048)
yedu	-0.075***	-0.016***	-0.046***	-0.010***	-0.046***	-0.010***
	(0.0024)	(0.0005)	(0.0025)	(0.0005)	(0.0025)	(0.0005)
type	0.102**	0.005	0.130***	0.008*	0.130***	0.008*
	(0.0470)	(0.0036)	(0.0488)	(0.0039)	(0.0495)	(0.0040)
type*age	-0.175**		-0.238***		-0.236***	
	(0.0853)		(0.0887)		(0.0897)	
type*age^2	0.067**		0.096***		0.095***	
	(0.0331)		(0.0345)		(0.0349)	
constant	1.244***		6.905***		6.916***	
	(0.0609)		(0.2115)		(0.2225)	
N	55900	55900	49691	49691	49687	49687

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (III), while (AME) columns report average marginal effects for each correspondent specification. Standard errors are in parenthesis; p-values for the coefficients of age and numeracy are adjusted following the Holm-Bonferroni's correction. p-value: * p<0.10, ** p<0.05, *** p<0.01

Table 7: **Model for financial risk attitude accounting for health**

Dep: risk_attitude	(Baseline)	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)	(IV)	(IV_AME)	(V)	(V_AME)
age	0.051***	0.262**	0.028***	0.271***	0.029***	0.254**	0.027***	0.258**	0.028***	0.261**	0.027***
	(0.0028)	(0.0908)	(0.0075)	(0.0905)	(0.0075)	(0.0907)	(0.0075)	(0.0908)	(0.0075)	(0.0905)	(0.0075)
age^2		-0.059*		-0.061		-0.058*		-0.059*		-0.060*	
		(0.0324)		(0.0323)		(0.0324)		(0.0324)		(0.0323)	
num_disease		0.045***	0.010***								
		(0.0101)	(0.0022)								
sphus				0.195***	0.043***					0.141***	0.031***
				(0.0205)	(0.0045)					(0.0248)	(0.0055)
hindex						0.060***	0.013***				
						(0.0069)	(0.0015)				
minord								0.057***	0.013***		
								(0.0121)	(0.0027)		
majord								0.051***	0.011***		
								(0.0189)	(0.0042)		
hindex1										0.033***	0.007***
										(0.0084)	(0.0018)
log_pincome		-0.577***	-0.127***	-0.564***	-0.124***	-0.563***	-0.124***	-0.573***	-0.126***	-0.558***	-0.123***
		(0.0201)	(0.0042)	(0.0200)	(0.0042)	(0.0201)	(0.0042)	(0.0200)	(0.0042)	(0.0200)	(0.0042)
pensiond_instrumented		0.112	0.025	0.123	0.027	0.120	0.027	0.109	0.024	0.126	0.028
		(0.1443)	(0.0318)	(0.1440)	(0.0318)	(0.1441)	(0.0318)	(0.1443)	(0.0318)	(0.1439)	(0.0318)
notworking		0.073	0.016	0.053	0.012	0.053	0.012	0.071	0.016	0.045	0.010
		(0.0783)	(0.0173)	(0.0782)	(0.0172)	(0.0782)	(0.0172)	(0.0783)	(0.0172)	(0.0782)	(0.0173)
single		-0.123***	-0.027***	-0.128***	-0.028***	-0.125***	-0.027***	-0.125***	-0.028***	-0.125***	-0.028***
		(0.0308)	(0.0068)	(0.0307)	(0.0068)	(0.0307)	(0.0068)	(0.0308)	(0.0068)	(0.0307)	(0.0068)
hhsize		-0.020*	-0.004*	-0.019*	-0.004*	-0.020*	-0.004*	-0.019*	-0.004*	-0.019*	-0.004*
		(0.0116)	(0.0025)	(0.0115)	(0.0025)	(0.0115)	(0.0025)	(0.0116)	(0.0025)	(0.0115)	(0.0025)
widow		0.077**	0.017**	0.082**	0.018**	0.077**	0.017**	0.077**	0.017**	0.078**	0.017**
		(0.0392)	(0.0086)	(0.0391)	(0.0086)	(0.0391)	(0.0086)	(0.0392)	(0.0086)	(0.0391)	(0.0086)
numeracy		0.120***	0.026***	0.108**	0.024**	0.110**	0.024***	0.120**	0.026***	0.106**	0.023**
		(0.0422)	(0.0093)	(0.0421)	(0.0093)	(0.0421)	(0.0093)	(0.0422)	(0.0093)	(0.0421)	(0.0093)
female	0.106***	0.440***	0.097***	0.441***	0.097***	0.431***	0.095***	0.441***	0.097***	0.436***	0.096***
	(0.0040)	(0.0215)	(0.0046)	(0.0215)	(0.0046)	(0.0215)	(0.0046)	(0.0216)	(0.0046)	(0.0215)	(0.0046)
yedu	-0.016***	-0.046***		-0.045***		-0.045***		-0.046***		-0.044***	
	(0.0005)	(0.0025)		(0.0025)		(0.0025)		(0.0025)		(0.0025)	
type	0.005	0.139***	0.009**	0.128***	0.008*	0.134***	0.009**	0.132***	0.009**	0.132***	0.008**
	(0.0036)	(0.0495)	(0.0040)	(0.0494)	(0.0040)	(0.0495)	(0.0040)	(0.0494)	(0.0040)	(0.0494)	(0.0040)
type*age		-0.240***		-0.230**		-0.233***		-0.232***		-0.233***	
		(0.0898)		(0.0896)		(0.0897)		(0.0897)		(0.0896)	
$type^2$		0.097***		0.093***		0.094***		0.095***		0.093***	
		(0.0349)		(0.0348)		(0.0349)		(0.0349)		(0.0349)	
constant		6.813***		6.644***		6.542***		6.754***		6.519***	
		(0.2233)		(0.2225)		(0.2251)		(0.2235)		(0.2247)	
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	55900	49599	49599	49687	49687	49596	49596	49687	49687	49596	49596

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. Col (Baseline) reports col (I_AME) of Table 6 for comparison purpose. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (V), while (AME) columns report average marginal effects for each correspondent specification. Standard errors are in parenthesis, p-values for the coefficients of age, health variables and numeracy are adjusted following the Holm-Bonferroni's correction. p-value: * p<0.10, ** p<0.05, *** p<0.01

Table 8: **Model for financial risk attitude (sub sample age 50-64)**

Dep: risk_attitude	(Baseline)	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)	(IV)	(IV_AME)	(V)	(V_AME)
age	0.050***	0.374*	0.017	0.352	0.019*	0.343*	0.016	0.364*	0.017	0.340*	0.017
	(0.0047)	(0.1733)	(0.0111)	(0.1727)	(0.0111)	(0.1731)	(0.0111)	(0.1731)	(0.0111)	(0.1728)	(0.0111)
age^2		-0.173		-0.152		-0.156		-0.167		-0.150	
		(0.1251)		(0.1248)		(0.1250)		(0.1250)		(0.1248)	
num_disease		0.038***	0.009***								
		(0.0122)	(0.0028)								
sphus				0.212***	0.049***					0.161***	0.037***
				(0.0243)	(0.0056)					(0.0297)	(0.0069)
hindex						0.060***	0.014***				
						(0.0080)	(0.0018)				
minord								0.057***	0.013***		
								(0.0143)	(0.0033)		
majord								0.045	0.010*		
								(0.0239)	(0.0055)		
hindex1										0.030***	0.007***
										(0.0097)	(0.0023)
log_pincome		-0.581***	-0.134***	-0.564***	-0.131***	-0.565***	-0.131***	-0.576***	-0.133***	-0.560***	-0.130***
		(0.0228)	(0.0050)	(0.0227)	(0.0050)	(0.0228)	(0.0050)	(0.0228)	(0.0050)	(0.0228)	(0.0050)
pensiond_inst		0.379**	0.088**	0.379**	0.088**	0.378**	0.088**	0.370**	0.086**	0.385**	0.089**
		(0.1848)	(0.0427)	(0.1842)	(0.0427)	(0.1845)	(0.0427)	(0.1847)	(0.0427)	(0.1842)	(0.0427)
notworking		-0.064	-0.015	-0.085	-0.020	-0.083	-0.019	-0.064	-0.015	-0.094	-0.022
		(0.1004)	(0.0232)	(0.1000)	(0.0232)	(0.1002)	(0.0232)	(0.1003)	(0.0232)	(0.1001)	(0.0232)
single		-0.151***	-0.035***	-0.155***	-0.036***	-0.151***	-0.035***	-0.153***	-0.035***	-0.151***	-0.035***
		(0.0352)	(0.0081)	(0.0350)	(0.0081)	(0.0351)	(0.0081)	(0.0351)	(0.0081)	(0.0350)	(0.0081)
hhsize		-0.015	-0.003	-0.014	-0.003	-0.015	-0.003	-0.014	-0.003	-0.014	-0.003
		(0.0124)	(0.0029)	(0.0124)	(0.0029)	(0.0124)	(0.0029)	(0.0124)	(0.0029)	(0.0124)	(0.0029)
widow		0.045	0.010	0.048	0.011	0.045	0.010	0.047	0.011	0.044	0.010
		(0.0541)	(0.0125)	(0.0539)	(0.0125)	(0.0540)	(0.0125)	(0.0541)	(0.0125)	(0.0539)	(0.0125)
numeracy		0.110*	0.025**	0.099*	0.023**	0.100	0.023**	0.110	0.025**	0.096	0.022**
		(0.0489)	(0.0113)	(0.0487)	(0.0113)	(0.0488)	(0.0113)	(0.0489)	(0.0113)	(0.0487)	(0.0113)
female	0.108***	0.461***	0.107***	0.463***	0.107***	0.454***	0.105***	0.462***	0.107***	0.459***	0.106***
	(0.0047)	(0.0243)	(0.0054)	(0.0242)	(0.0054)	(0.0242)	(0.0054)	(0.0243)	(0.0054)	(0.0242)	(0.0054)
yedu	-0.016***	-0.044***		-0.043***		-0.042***		-0.044***		-0.042***	
	(0.0006)	(0.0030)		(0.0030)		(0.0030)		(0.0030)		(0.0030)	
type	0.002	0.149**	0.009	0.139**	0.007	0.145**	0.008	0.144**	0.009	0.142**	0.008
	(0.0066)	(0.0649)	(0.0073)	(0.0647)	(0.0073)	(0.0648)	(0.0073)	(0.0648)	(0.0073)	(0.0648)	(0.0073)
type*age		-0.336*		-0.311		-0.321*		-0.327*		-0.312	
		(0.1934)		(0.1928)		(0.1931)		(0.1931)		(0.1930)	
type*age^2		0.176		0.158		0.164		0.171		0.157	
		(0.1261)		(0.1258)		(0.1260)		(0.1260)		(0.1259)	
constant		6.793***		6.588***		6.499***		6.718***		6.484***	
		(0.2506)		(0.2492)		(0.2525)		(0.2506)		(0.2519)	
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	39350	35425	35425	35502	35502	35422	35422	35502	35502	35422	35422

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. Col (Baseline) reports the AME for age of specification (I) of Table 6 for the sub sample for comparison purpose. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (V), while (AME) columns report average marginal effects for each correspondent specification. Standard errors are in parenthesis, p-values for the coefficients of age, health variables and numeracy are adjusted following the Holm-Bonferroni's correction. p-value: * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 9: **Model for financial risk attitude (sub sample age 65-75)**

Dep: risk_attitude	(Baseline)	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)	(IV)	(IV_AME)	(V)	(V_AME)
age	0.040***	0.455	0.018**	0.477	0.017*	0.440	0.016*	0.497	0.017**	0.340	0.017
	(0.0075)	(1.2050)	(0.0089)	(1.2049)	(0.0089)	(1.2042)	(0.0089)	(1.2056)	(0.0089)	(0.1728)	(0.0111)
age^2		-0.113		-0.117		-0.111		-0.123		-0.150	
		(0.3042)		(0.3042)		(0.3040)		(0.3044)		(0.1248)	
num_disease		0.058***	0.011***								
		(0.0150)	(0.0030)								
sphus				0.175***	0.035***					0.161**	0.037**
				(0.0318)	(0.0062)					(0.0297)	(0.0069)
hindex						0.067***	0.013***				
						(0.0113)	(0.0022)				
minord								0.051**	0.010***		
								(0.0185)	(0.0036)		
majord								0.074**	0.015***		
								(0.0266)	(0.0052)		
hindex1										0.030***	0.007***
										(0.0097)	(0.0023)
log_pincome		-0.612***	-0.121***	-0.606***	-0.119***	-0.598***	-0.118***	-0.612***	-0.121***	-0.560***	-0.130***
		(0.0345)	(0.0064)	(0.0346)	(0.0064)	(0.0346)	(0.0064)	(0.0346)	(0.0064)	(0.0228)	(0.0050)
pensiond_inst		0.178	0.035	0.166	0.033	0.177	0.035	0.175	0.034	0.385**	0.089**
		(0.3246)	(0.0640)	(0.3251)	(0.0640)	(0.3243)	(0.0640)	(0.3249)	(0.0640)	(0.1842)	(0.0427)
notworking		0.161*	0.032*	0.156*	0.031*	0.152*	0.030*	0.160*	0.031*	-0.094	-0.022
		(0.0830)	(0.0164)	(0.0830)	(0.0164)	(0.0829)	(0.0164)	(0.0831)	(0.0164)	(0.1001)	(0.0232)
single		-0.058	-0.011	-0.062	-0.012	-0.063	-0.012	-0.059	-0.012	-0.151***	-0.035***
		(0.0538)	(0.0106)	(0.0538)	(0.0106)	(0.0537)	(0.0106)	(0.0538)	(0.0106)	(0.0350)	(0.0081)
hhsize		-0.036	-0.007	-0.038	-0.007	-0.039	-0.008	-0.035	-0.007	-0.014	-0.003
		(0.0250)	(0.0049)	(0.0250)	(0.0049)	(0.0250)	(0.0049)	(0.0251)	(0.0049)	(0.0124)	(0.0029)
widow		0.002	0.000	0.008	0.002	0.005	0.001	0.001	0.000	0.044	0.010
		(0.0527)	(0.0104)	(0.0527)	(0.0104)	(0.0526)	(0.0104)	(0.0528)	(0.0104)	(0.0539)	(0.0125)
numeracy		0.048	0.009	0.035	0.007	0.040	0.008	0.048	0.009	0.096	0.022**
		(0.0674)	(0.0133)	(0.0675)	(0.0133)	(0.0673)	(0.0133)	(0.0675)	(0.0133)	(0.0487)	(0.0113)
female	0.093***	0.418***	0.082***	0.412***	0.081***	0.401***	0.079***	0.418***	0.082***	0.459***	0.106***
	(0.0054)	(0.0377)	(0.0073)	(0.0377)	(0.0073)	(0.0377)	(0.0073)	(0.0378)	(0.0073)	(0.0242)	(0.0054)
yedu	-0.015***	-0.055***		-0.054***		-0.054***		-0.055***		-0.042***	
	(0.0007)	(0.0041)		(0.0041)		(0.0041)		(0.0041)		(0.0030)	
type	0.012*	1.411	0.018***	1.399	0.016**	1.340	0.017**	1.456	0.018***	0.142**	0.008
	(0.0062)	(1.2014)	(0.0069)	(1.2011)	(0.0069)	(1.2008)	(0.0069)	(1.2017)	(0.0069)	(0.0648)	(0.0073)
type*age		-1.441		-1.429		-1.373		-1.483		-0.312	
		(1.2284)		(1.2281)		(1.2277)		(1.2287)		(0.1930)	
type*age^2		0.377		0.372		0.359		0.386		0.157	
		(0.3085)		(0.3084)		(0.3083)		(0.3086)		(0.1259)	
constant		6.928***		6.850***		6.670***		6.880***		6.484***	
		(1.2069)		(1.2062)		(1.2069)		(1.2076)		(0.2519)	
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	23097	20027	20027	20058	20058	20027	20027	20058	20058	354 ¿ 22	35422

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. Col (Baseline) reports the AME for age of specification (I) of Table 6 for the sub sample for comparison purpose. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (V), while (AME) columns report average marginal effects for each correspondent specification. Standard errors are in parenthesis, p-values for the coefficients of age, health variables and numeracy are adjusted following the Holm-Bonferroni's correction. p-value: * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 10: **Model for financial risk attitude (sub sample: male)**

Dep: risk_attitude	(Baseline)	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)	(IV)	(IV_AME)	(V)	(V_AME)
age	0.060***	0.598***	0.055***	0.600***	0.057***	0.597***	0.054***	0.589***	0.055***	0.601***	0.055***
	(0.0052)	(0.1344)	(0.0117)	(0.1340)	(0.0117)	(0.1342)	(0.0117)	(0.1343)	(0.0117)	(0.1341)	(0.0117)
age^2		-0.156***		-0.154***		-0.155***		-0.153***		-0.156***	
		(0.0476)		(0.0474)		(0.0475)		(0.0475)		(0.0475)	
num_disease		0.039**	0.009***								
		(0.0144)	(0.0034)								
sphus				0.169***	0.040***					0.112***	0.027***
				(0.0296)	(0.0070)					(0.0365)	(0.0087)
hindex						0.058***	0.014***				
						(0.0104)	(0.0025)				
minord								0.048**	0.011***		
								(0.0178)	(0.0042)		
majord								0.062**	0.015**		
								(0.0262)	(0.0062)		
hindex1										0.035**	0.008***
										(0.0128)	(0.0030)
log_pincome		-0.622***	-0.147***	-0.610***	-0.145***	-0.610***	-0.145***	-0.617***	-0.146***	-0.607***	-0.144***
		(0.0293)	(0.0065)	(0.0292)	(0.0065)	(0.0293)	(0.0065)	(0.0293)	(0.0065)	(0.0293)	(0.0065)
pensiond_inst		-0.320	-0.076	-0.311	-0.074	-0.320	-0.076	-0.324	-0.077	-0.313	-0.074
		(0.2288)	(0.0542)	(0.2282)	(0.0542)	(0.2284)	(0.0541)	(0.2286)	(0.0542)	(0.2282)	(0.0542)
notworking		0.299**	0.071**	0.280**	0.067**	0.282**	0.067**	0.296**	0.070**	0.274**	0.065**
		(0.1263)	(0.0299)	(0.1260)	(0.0299)	(0.1261)	(0.0299)	(0.1262)	(0.0299)	(0.1260)	(0.0299)
hhsize		-0.035**	-0.008**	-0.035**	-0.008**	-0.036**	-0.008**	-0.035**	-0.008**	-0.035**	-0.008**
		(0.0165)	(0.0039)	(0.0164)	(0.0039)	(0.0165)	(0.0039)	(0.0165)	(0.0039)	(0.0164)	(0.0039)
single		-0.128***	-0.030***	-0.137***	-0.033***	-0.132***	-0.031***	-0.132***	-0.031***	-0.133***	-0.032***
		(0.0476)	(0.0113)	(0.0474)	(0.0113)	(0.0475)	(0.0113)	(0.0475)	(0.0113)	(0.0475)	(0.0113)
widow		0.266***	0.063***	0.272***	0.065***	0.268***	0.063***	0.269***	0.064***	0.268***	0.064***
		(0.0752)	(0.0178)	(0.0749)	(0.0178)	(0.0750)	(0.0178)	(0.0751)	(0.0178)	(0.0749)	(0.0178)
numeracy		0.173**	0.041**	0.158**	0.038**	0.165**	0.039**	0.174**	0.041**	0.158**	0.038**
		(0.0715)	(0.0169)	(0.0713)	(0.0169)	(0.0713)	(0.0169)	(0.0715)	(0.0169)	(0.0713)	(0.0169)
yedu	-0.019***	-0.055***		-0.054***		-0.054***		-0.055***		-0.053***	
	(0.0007)	(0.0036)		(0.0036)		(0.0036)		(0.0036)		(0.0036)	
type	0.000	0.220***	0.018***	0.200***	0.016***	0.218***	0.017***	0.204***	0.017***	0.216***	0.017***
	(.)	(0.0740)	(0.0062)	(0.0737)	(0.0062)	(0.0740)	(0.0062)	(0.0738)	(0.0062)	(0.0739)	(0.0062)
type*age		-0.379***		-0.352***		-0.375***		-0.355***		-0.373***	
		(0.1318)		(0.1315)		(0.1317)		(0.1316)		(0.1317)	
type*age^2		0.156***		0.146***		0.154***		0.150***		0.152***	
		(0.0508)		(0.0507)		(0.0508)		(0.0508)		(0.0507)	
constant		7.204***		7.054***		6.954***		7.141***		6.945***	
		(0.3247)		(0.3234)		(0.3270)		(0.3243)		(0.3266)	
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	24962	22797	22797	22837	22837	22797	22797	22837	22837	22797	22797

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. Col (Baseline) reports the AME for age following the specification of Table 6 col (I_AME) for the sub sample. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (V), while (AME) columns report average marginal effects for each correspondent specification. Standard errors are in parenthesis, p-values for the coefficients of age, health variables and numeracy are adjusted following the Holm-Bonferroni's correction. p-value: * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 11: **Model for financial risk attitude (sub sample: female)**

Dep: risk_attitude	(Baseline)	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)	(IV)	(IV_AME)	(V)	(V_AME)
age	0.041***	-0.025	0.006	-0.012	0.006	-0.039	0.003	-0.025	0.005	-0.031	0.004
	(0.0043)	(0.1239)	(0.0099)	(0.1236)	(0.0098)	(0.1238)	(0.0098)	(0.1239)	(0.0099)	(0.1236)	(0.0099)
age^2		0.022		0.018		0.024		0.021		0.021	
		(0.0443)		(0.0443)		(0.0443)		(0.0444)		(0.0442)	
num_disease		0.054***	0.011***								
		(0.0140)	(0.0029)								
sphus				0.220***	0.045***					0.164***	0.034***
				(0.0282)	(0.0058)					(0.0336)	(0.0069)
hindex						0.063***	0.013***				
						(0.0092)	(0.0019)				
minord								0.072***	0.015***		
								(0.0165)	(0.0034)		
majord								0.032	0.006		
								(0.0274)	(0.0056)		
hindex1										0.034***	0.007***
										(0.0109)	(0.0023)
log_pincome		-0.533***	-0.110***	-0.519***	-0.107***	-0.516***	-0.106***	-0.529***	-0.109***	-0.510***	-0.105***
		(0.0275)	(0.0054)	(0.0274)	(0.0054)	(0.0275)	(0.0054)	(0.0275)	(0.0054)	(0.0275)	(0.0054)
pensiond_inst		0.479**	0.099**	0.498***	0.103***	0.498***	0.103***	0.479**	0.099**	0.504***	0.104***
		(0.1877)	(0.0386)	(0.1874)	(0.0386)	(0.1874)	(0.0386)	(0.1878)	(0.0386)	(0.1871)	(0.0386)
notworking		-0.115	-0.024	-0.139	-0.029	-0.138	-0.028	-0.117	-0.024	-0.148	-0.031
		(0.1002)	(0.0206)	(0.1001)	(0.0206)	(0.1001)	(0.0206)	(0.1003)	(0.0206)	(0.1000)	(0.0206)
hhsize		-0.004	-0.001	-0.004	-0.001	-0.004	-0.001	-0.004	-0.001	-0.004	-0.001
		(0.0163)	(0.0034)	(0.0162)	(0.0033)	(0.0163)	(0.0033)	(0.0163)	(0.0034)	(0.0162)	(0.0033)
single		-0.116***	-0.024***	-0.118***	-0.024***	-0.116***	-0.024***	-0.116***	-0.024***	-0.116***	-0.024***
		(0.0403)	(0.0083)	(0.0402)	(0.0083)	(0.0402)	(0.0083)	(0.0403)	(0.0083)	(0.0401)	(0.0083)
widow		0.010	0.002	0.014	0.003	0.009	0.002	0.008	0.002	0.010	0.002
		(0.0461)	(0.0095)	(0.0460)	(0.0095)	(0.0461)	(0.0095)	(0.0462)	(0.0095)	(0.0460)	(0.0095)
numeracy		0.092	0.019*	0.083	0.017	0.082	0.017	0.091*	0.019*	0.079	0.016
		(0.0512)	(0.0105)	(0.0511)	(0.0105)	(0.0511)	(0.0105)	(0.0513)	(0.0105)	(0.0510)	(0.0105)
yedu	-0.013***	-0.037***		-0.036***		-0.035***		-0.036***		-0.035***	
	(0.0006)	(0.0036)		(0.0036)		(0.0036)		(0.0036)		(0.0036)	
type	0.000	0.070	0.003	0.068	0.002	0.062	0.002	0.072	0.003	0.061	0.002
	(.)	(0.0668)	(0.0051)	(0.0666)	(0.0050)	(0.0667)	(0.0050)	(0.0667)	(0.0050)	(0.0666)	(0.0050)
type*age		-0.116		-0.123		-0.105		-0.123		-0.108	
		(0.1229)		(0.1227)		(0.1228)		(0.1229)		(0.1227)	
$type*age^2$		0.044		0.045		0.039		0.046		0.040	
		(0.0482)		(0.0481)		(0.0481)		(0.0482)		(0.0481)	
constant		6.849***		6.668***		6.544***		6.789***		6.509***	
		(0.3122)		(0.3114)		(0.3149)		(0.3129)		(0.3142)	
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	30938	26802	26802	26850	26850	26799	26799	26850	26850	26799	26799

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. Col (Baseline) reports the AME for age following the specification of Table 6 col (I_AME) for the sub sample. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (V), while (AME) columns report average marginal effects for each correspondent specification. Standard errors are in parenthesis, p-values for the coefficients of age, health variables and numeracy are adjusted following the Holm-Bonferroni's correction. p-value: * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 12: **Model for financial risk attitude accounting for personality traits**

Dep: risk_attitude	(Baseline)	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)	(IV)	(IV_AME)	(V)	(V_AME)
age	0.051***	0.001	0.021**	0.021	0.022***	0.002	0.020**	0.005	0.021**	0.009	0.020**
	(0.0028)	(0.0821)	(0.0080)	(0.0819)	(0.0080)	(0.0820)	(0.0080)	(0.0821)	(0.0080)	(0.0819)	(0.0080)
age^2		0.037		0.031		0.035		0.035		0.033	
		(0.0216)		(0.0216)		(0.0216)		(0.0216)		(0.0216)	
num_disease		0.041***	0.009***								
		(0.0101)	(0.0022)								
sphus				0.177***	0.039***					0.128***	0.028***
				(0.0206)	(0.0045)					(0.0248)	(0.0055)
hindex						0.054***	0.012***				
						(0.0070)	(0.0015)				
minord								0.054***	0.012***		
								(0.0121)	(0.0027)		
majord								0.044*	0.010**		
								(0.0189)	(0.0042)		
hindex1										0.030***	0.007***
										(0.0084)	(0.0018)
neuroticism		-0.042	-0.009*	-0.023	-0.005	-0.025	-0.005	-0.040	-0.009*	-0.016	-0.004
		(0.0232)	(0.0051)	(0.0233)	(0.0052)	(0.0234)	(0.0052)	(0.0232)	(0.0051)	(0.0234)	(0.0052)
opentoexp		-0.086**	-0.019***	-0.080*	-0.018**	-0.081*	-0.018**	-0.089***	-0.020***	-0.078*	-0.017**
		(0.0323)	(0.0071)	(0.0322)	(0.0071)	(0.0323)	(0.0071)	(0.0323)	(0.0071)	(0.0322)	(0.0071)
extroversion		-0.250***	-0.055***	-0.246***	-0.054***	-0.246***	-0.054***	-0.251***	-0.055***	-0.243***	-0.054***
		(0.0237)	(0.0052)	(0.0237)	(0.0052)	(0.0237)	(0.0052)	(0.0237)	(0.0052)	(0.0237)	(0.0052)
agreeableness		-0.155***	-0.034***	-0.148***	-0.033***	-0.152***	-0.034***	-0.153***	-0.034***	-0.149***	-0.033***
		(0.0204)	(0.0045)	(0.0204)	(0.0045)	(0.0204)	(0.0045)	(0.0204)	(0.0045)	(0.0204)	(0.0045)
log_pincome		-0.550***	-0.121***	-0.539***	-0.119***	-0.538***	-0.119***	-0.547***	-0.120***	-0.535***	-0.118***
		(0.0200)	(0.0042)	(0.0200)	(0.0042)	(0.0201)	(0.0042)	(0.0200)	(0.0042)	(0.0200)	(0.0042)
pensiond_inst		0.156	0.034	0.161	0.036	0.160	0.035	0.154	0.034	0.164	0.036
		(0.1441)	(0.0318)	(0.1438)	(0.0317)	(0.1439)	(0.0317)	(0.1441)	(0.0317)	(0.1438)	(0.0317)
notworking		0.037	0.008	0.022	0.005	0.022	0.005	0.035	0.008	0.015	0.003
		(0.0777)	(0.0171)	(0.0776)	(0.0171)	(0.0776)	(0.0171)	(0.0777)	(0.0171)	(0.0776)	(0.0171)
hhsize		-0.015	-0.003	-0.015	-0.003	-0.015	-0.003	-0.015	-0.003	-0.015	-0.003
		(0.0115)	(0.0025)	(0.0115)	(0.0025)	(0.0115)	(0.0025)	(0.0115)	(0.0025)	(0.0115)	(0.0025)
single		-0.106***	-0.023***	-0.112***	-0.025***	-0.108***	-0.024***	-0.109***	-0.024***	-0.109***	-0.024***
		(0.0307)	(0.0068)	(0.0306)	(0.0068)	(0.0307)	(0.0068)	(0.0307)	(0.0068)	(0.0306)	(0.0068)
widow		0.069*	0.015*	0.074*	0.016*	0.069*	0.015*	0.070*	0.015*	0.071*	0.016*
		(0.0390)	(0.0086)	(0.0389)	(0.0086)	(0.0389)	(0.0086)	(0.0390)	(0.0086)	(0.0389)	(0.0086)
numeracy		0.108**	0.024***	0.098*	0.022**	0.100**	0.022**	0.109**	0.024***	0.096*	0.021**
		(0.0419)	(0.0092)	(0.0419)	(0.0092)	(0.0419)	(0.0092)	(0.0420)	(0.0092)	(0.0418)	(0.0092)
female	0.106***	0.454***	0.100***	0.455***	0.100***	0.446***	0.098***	0.455***	0.100***	0.450***	0.099***
	(0.0040)	(0.0215)	(0.0046)	(0.0215)	(0.0046)	(0.0215)	(0.0046)	(0.0216)	(0.0046)	(0.0215)	(0.0046)
yedu	-0.016***	-0.041***	-0.009***	-0.040***	-0.009***	-0.040***	-0.009***	-0.041***	-0.009***	-0.040***	-0.009***
	(0.0005)	(0.0025)	(0.0006)	(0.0025)	(0.0006)	(0.0025)	(0.0006)	(0.0025)	(0.0006)	(0.0025)	(0.0006)
type	0.005	3.758***		3.594***		3.644***		3.653***		3.633***	
	(0.0036)	(1.3493)		(1.3472)		(1.3485)		(1.3485)		(1.3479)	
type*age		0.120***		0.115***		0.117***		0.117***		0.116***	
		(0.0436)		(0.0435)		(0.0436)		(0.0436)		(0.0436)	
$type*age^2$		-0.001***		-0.001***		-0.001***		-0.001***		-0.001***	
		(0.0003)		(0.0003)		(0.0003)		(0.0003)		(0.0003)	
constant		2.960**		2.957**		2.821**		3.000**		2.806**	
		(1.3403)		(1.3382)		(1.3396)		(1.3396)		(1.3389)	
Country Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	55900	49599	49599	49687	49687	49596	49596	49687	49687	49596	49596

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. Col (Baseline) is col(I) of table 6. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (V). The age coefficients presented includes the linear, the squared and the interaction terms. The type terms includes the interaction terms as well. Standard errors are in parenthesis, p-values for the coefficients of age, health variables, numeracy and personality traits are adjusted following the Holm-Bonferroni's correction. p-value: * p<0.10, ** p<0.05, *** p<0.01

Table 13: **Model for financial risk attitude accounting for geographical pattern**

Dep: risk_attitude	(Baseline)	(I)	(I_AME)	(II)	(II_AME)	(III)	(III_AME)
age	0.051***	0.407***	0.062***	0.569***	0.072***	0.300**	0.048***
	(0.0028)	(0.0910)	(0.0078)	(0.1117)	(0.0106)	(0.1274)	(0.0124)
age^2		-0.050		-0.097		-0.032	
		(0.0331)		(0.0378)		(0.0409)	
risktol_country		-5.013***	-0.093***			-6.183***	-0.096***
		(1.8493)	(0.0061)			(2.0572)	(0.0065)
risktol_country*age		0.168***				0.198***	
		(0.0588)				(0.0654)	
risktol_country*age^2		-0.001***				-0.001***	
		(0.0004)				(0.0005)	
risktol_country*working		-0.848***				-0.782***	
		(0.1858)				(0.2076)	
risktol_country*pensiond_inst		-1.065***				-0.985***	
		(0.3296)				(0.3670)	
riskav_country				0.399	0.025***	-2.345	-0.009
				(1.5326)	(0.0055)	(1.6956)	(0.0059)
riskav_country*age				-0.030		0.061	
				(0.0485)		(0.0536)	
riskav_country*age^2				0.000		-0.000	
				(0.0004)		(0.0004)	
riskav_country*working				0.524***		0.084	
				(0.1151)		(0.1292)	
riskav_country*pensiond_inst				0.696***		0.100	
				(0.2060)		(0.2301)	
num_disease		0.037***	0.008***	0.037***	0.008***	0.036***	0.008***
		(0.0101)	(0.0022)	(0.0102)	(0.0023)	(0.0101)	(0.0022)
log_pincome		-0.432***	-0.095***	-0.430***	-0.095***	-0.444***	-0.098***
		(0.0126)	(0.0026)	(0.0153)	(0.0032)	(0.0153)	(0.0032)
pensiond_inst		-0.604***	-0.174***	-1.278***	-0.212***	-0.670***	-0.175***
		(0.1129)	(0.0251)	(0.1820)	(0.0268)	(0.2099)	(0.0269)
notworking		0.391***	0.086***	0.889***	0.197***	0.447***	0.099***
		(0.0608)	(0.0134)	(0.1023)	(0.0226)	(0.1183)	(0.0261)
single		-0.005	-0.001	0.021	0.005	-0.011	-0.002
		(0.0292)	(0.0064)	(0.0296)	(0.0065)	(0.0296)	(0.0065)
widow		0.099**	0.022**	0.113***	0.025***	0.100**	0.022**
		(0.0394)	(0.0087)	(0.0397)	(0.0088)	(0.0395)	(0.0087)
numeracy		0.142***	0.031***	0.145***	0.032***	0.141***	0.031***
		(0.0427)	(0.0094)	(0.0430)	(0.0095)	(0.0427)	(0.0094)
hhsize		-0.004	-0.001	0.006	0.001	-0.003	-0.001
		(0.0117)	(0.0026)	(0.0118)	(0.0026)	(0.0117)	(0.0026)
female	0.106***	0.389***	0.086***	0.383***	0.085***	0.388***	0.086***
	(0.0040)	(0.0210)	(0.0045)	(0.0212)	(0.0046)	(0.0211)	(0.0046)
yedu	-0.016***	-0.057***	-0.013***	-0.060***	-0.013***	-0.057***	-0.013***
	(0.0005)	(0.0024)	(0.0005)	(0.0024)	(0.0005)	(0.0024)	(0.0005)
type	0.005	2.413*	0.001	2.045	-0.005	2.376*	0.001
	(0.0036)	(1.3627)	(0.0039)	(1.3717)	(0.0039)	(1.3767)	(0.0039)
type*age		-0.077*		-0.067		-0.077*	
		(0.0440)		(0.0443)		(0.0445)	
type*age^2		0.001*		0.001		0.001*	
		(0.0004)		(0.0004)		(0.0004)	
constant		5.432***		5.314***		5.684***	
		(0.1507)		(0.1861)		(0.1884)	
N	55900	49599	49599	49599	49599	49599	49599

NOTE: Dependent variable is 1 if the individual is risk averse and 0 otherwise. Age has been rescale [age=(age -50)/100], so that 1 year more accounts for +0.10. Col (Baseline) is col(I) of table 6. The model is estimated via probit random effect, coefficients are reported in columns from (I) to (V). The age coefficients presented includes the linear, the squared and the interaction terms. The type terms includes the interaction terms as well. Standard errors are in parenthesis, p-values for the coefficients of age, health variables and numeracy are adjusted following the Holm-Bonferroni's correction.
p-value: * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 14: **Linear probability model for stock ownership**

Dep. variable:	**Stock_ownership**
Risk attitude	
Not willing to take financial risk	(base)
Average financial risk	1.950***
	(0.1556)
Above average financial risk	3.092***
	(0.0920)
Substantial financial risk	2.008***
	(0.0438)
age	0.149
	(0.1115)
age^2	-0.010
	(0.0354)
yedu	0.116***
	(0.0055)
couple	0.927***
	(0.0585)
hhsize	-0.200***
	(0.0269)
chronic	-0.120***
	(0.0145)
working	0.438***
	(0.0659)
retired	0.217***
	(0.0656)
constant	-4.793***
	(0.1370)
Country Dummy	Yes
N	55900

NOTE: The dependent variable 1 if individual owns stocks, and 0 otherwise. The model is estimated via linear probability model. Standard errors are in parenthesis, p-value: * p<0.10, ** p<0.05, *** p<0.01

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