

# Nudging financial and demographic literacy: experimental evidence from an Italian Trade Union Pension Fund

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**Abstract:** In this article, we present and test experimentally a low-cost, Internet-based, financial and demographic literacy program that we designed for implementation with the largest industrial pension fund in Italy. The program, *Finlife* (Financial Education and Planning for a Long Life) included 1) an instructional video and materials provided through the Internet; 2) an experimental design that explicitly allows to evaluate the impact of the instructional video and materials on financial and demographic literacy, as well as on short-term behavioral changes; 3) a follow-up to assess the stability of some of the experimental outcomes. *Finlife* was designed to be a low-cost and scalable approach to increase financial and demographic literacy, consistently with a ‘nudge’ philosophy. We show that *Finlife* delivered a substantially and statistically significant increase in financial and demographic literacy, as well as a push towards behaviors involving seeking more information on financial markets and choices related to financial planning.

**Keywords:** pensions, financial literacy, demographic literacy, field experiment, Italian Trade Union Pension Fund

**JEL Classification:** D91

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# 1. Introduction

Education is of crucial importance for our understanding of the world and for the shaping of society. Education includes essential elements of literacy, in a broad definition that includes numeracy and knowledge about the functioning of the world. Inequalities in education and literacy are crucial determinants of the unequal chances that individuals and households face, as well as of the economic performance of societies as a whole. The opportunity of living longer as a consequence of the demographic transition increases the returns to education (Lee, 2003). At the individual and household level, longer lives bring the challenge of having to plan for a longer term. At the aggregate level, population aging – again a consequence of the demographic transition – with an increasing share of older individuals within the population, amplifies the economic consequences of planning decisions. For these reasons, financial literacy, i.e. the “ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions” (Lusardi & Mitchell, 2014, p. 6), and the awareness of the need to plan for the long term given the chances of living a long life – which we here call “demographic literacy” – are fundamental skills in preventing bad financial, health, and social outcomes in later life for individuals and households, and allow to improve the ability of societies and economies to respond to the challenges of population ageing. Improving financial – and demographic – literacy should therefore be seen as a central goal for all societies (Lusardi & Mitchell, 2014; OECD, 2012).

The goal of achieving greater and widespread financial and demographic literacy faces major challenges. While it is feasible, and highly desirable, to embed these elements of literacy within the mainstream education system and therefore target children and youth, the effect of longer lives on economies and societies are already visible and there is a need to reach adults as well. For the majority of the workforce, education has been completed, and despite the attempts to develop life-long learning, going back to traditional education is not a scalable option. It is therefore paramount to find feasible, as well as relatively low-cost, strategies to improve the financial and demographic literacy of working-age adults.

The literature generally agrees on the desirable outcomes brought by financial literacy (see for instance the review by Lusardi and Mitchell (2014)), albeit the majority of the studies are based on observational design and therefore provide evidence on the association between financial literacy and outcomes. If we focus only on working-age adults, individuals who are more financially literate are more likely to actually be planning for retirement (Lusardi & Mitchell, 2007, 2009). Guiso and Jappelli (2009) show that higher financial literacy is associated with a greater propensity to diversify one’s own portfolio. Van Rooij et al. (2011a) show that financial literacy is linked to wealth accumulation through two documented channels: increasing likelihood of participation in the stock market and fostering planning behavior. Using a household survey, Bernheim and Garrett (2003) show that the provision of employer-based financial education is associated with a higher propensity to save, both in general and for retirement. Retirement seminars are more strongly associated with the participation in savings plan than the provision of written material, and this relationship is stronger for lower-income employees (Bayer, Bernheim, & Scholz, 2009). Participations to retirement seminars has stronger effects for women (R. L.

Clark, d'Ambrosio, McDermed, & Sawant, 2006). While the evidence on the role of retirement seminars is cumulating, randomized designs are basically absent (Allen, Clark, Maki, & Sandler Morrill, 2016; R. Clark, Lusardi, & Mitchell, 2015). Gamble and coauthors (Gamble, Boyle, Yu, & Bennett, 2015) provide indirect evidence for the relevance of financial education for older adults by examining the effect of aging on financial decision making. They find that that a decrease in cognition is associated with a decrease in financial literacy. Interestingly, a decrease in cognition also predicts a drop in self-confidence in general, but it is not associated with a drop in confidence in managing one's own finances.

There are however also some pieces of evidence and voices that are more skeptical on the importance of financial literacy. In a meta-analysis on the effect of financial literacy and financial education on behaviors, Fernandes et al. (2014), find that only a tiny proportion of the variance of financial behaviors can be improved by interventions, with a weaker effect for lower-income samples. Financial education tends to decay over time, and correlational studies tend to exaggerate the relevance of financial education. We agree with Meier and Sprenger that, in order to address this skepticism, and to evaluate the effects of educational interventions, it is essential to start from experimental designs, as voluntary participation in financial literacy programs is selective (Meier & Sprenger, 2013).

In this article, we present the results of the evaluation of a low-cost, Internet-based, financial and demographic literacy program, Finlife, which we designed for implementation with the largest industrial pension fund in Italy. Our approach was based on 1) an instructional video and materials provided through the Internet; 2) an experimental design that explicitly allows to evaluate the impact of the instructional video and materials on financial and demographic literacy, as well as short-term behavioral changes; 3) a follow-up to assess the stability of some of the outcomes in stage. As a preview of our findings, Finlife delivered a substantially and statistically significant increase in financial and demographic literacy, as well as a push in behaviors involving a greater attention to financial markets and choices related to financial planning.

The remainder of this paper is structured as follows. In Section 2 we introduce our strategy and the setting of our study. In Section 3 we illustrate our program, Finlife, and our experimental design strategy. Results are presented in Section 4. Section 5 summarizes and concludes

## 2. The Setting

How is it possible to effectively and efficiently reach higher desirable levels of financial (and demographic) literacy? As we already argued introducing this paper, while there is evidence on the effect of financial education programs on behavioral outcomes, this is not yet conclusive (Collins & O'Rourke, 2010). Targeting adults is therefore important both for the current need and for the bigger incentives that adults face, and we focused on this setting.

We build on earlier results on programs targeted on adults. Bernheim and Garret (2003) and Lusardi (2004) showed that employees exposed to employer-based retirement seminars have larger average savings. However, Duflo and Saez (2002) found opposite evidence. Willis (2008) raised a critical and provocative voice, putting forward three arguments *against* financial education: 1) self-selection into program participation; 2) the lack of focus on behavioral

responses in assessments of financial education; 3) the risk that financial education increases confidence to a too great extent, leading to the risk of bad decisions influenced by overconfidence. These critiques are important in informing our approach.

We also build on the behavioral economics’ “nudge” approach (Thaler & Sunstein, 2008), in aiming to build a strategy that is relatively low-cost and yet effective, therefore maximizing efficiency. The low-cost approach is important, both in financial terms (as public finance is tight and employers are unlikely to invest huge amounts in financial education), and in terms of fast and large-scale deployability.

We developed and run an experiment on workers enrolled with the “Cometa” pension fund in Italy. Cometa is a defined-contribution closed industry pension fund devoted to workers of the engineering and plant installation sector, that has been established in 1997 based on a collective agreement among employers’ federations and trade unions, and has been later extended to the sector of goldsmiths (who represent however a minority component - less than 0.4% of members at the end of 2014). Like most similar pension funds in Italy, Cometa does not manage funds directly but they have delegated investment choices to selected professional investment managers (banks, insurance companies and/or asset management companies). Starting in 2005, Cometa has set up multiple investment lines with different risk-return profiles, and the fund member can choose freely the line to invest his or her money in (and also has the option to change the investment line subsequently). The four investment lines existing at the end of 2014, before the experiment started, are reported in Table 1.

Table 1. Investment lines of the Cometa pension fund.

| Name of the investment line                        | “Sicurezza”<br>(Safety)                          | “Monetario plus”<br>(Money market plus) | “Reddito”<br>(Income)   | “Crescita”<br>(Growth)  |
|--|--|---|-------------------------|-------------------------|
| Investment profile<br>(reported on Cometa website) | Minimum guaranteed return, maximum 10% of stocks | 100% bonds                              | 85% bonds<br>15% stocks | 60% bonds<br>40% stocks |
| Number of members (end of 2014)                    | 58,057<br>(14.2%)                                | 173,634<br>(42.5%)                      | 160,832<br>(39.3%)      | 16,274<br>(4.0%)        |

Source: Cometa.

The much larger number of fund members in two investment lines is partly due also to the fact that for many years “Reddito” first and later “Monetario Plus” have been the default investment lines, i.e. the lines to which new members were attributed in absence of an explicit choice. For instance, in 2014 78% of the new members have remained in the “Monetario plus” line, which was the default choice, while 22% have opted for one of the other three lines. Members also have the option to make voluntary extra contributions or to ask for early withdrawals for (a) health-related expenses due to very serious and properly certified health problems of the member or of close relatives, (b) for the first time home purchases (for the member or for member’s sons), (c)

for other reasons, with no need to motivate it to the fund (up to a maximum of 30% of the individual position of the member, while the first two types of early withdrawals are capped at 75% of the individual position). Early withdrawals for first time home purchases and unmotivated ones are available only after at least 8 years of membership in the pension fund, while no such limits exist for health-related early withdrawals.

As of the end of 2014, before the experiment started, Cometa pension fund had a total of 408,797 members (407,321 from the engineering sector and 1,476 from the jewellery sector). Members include factory workers and mostly lower-level clerks/office workers (“impiegati”), while higher-level managers and executives have historically invested into different pension funds. Cometa pension fund is by far the largest closed pension fund in Italy (as the end of 2014 it accounted for more than 21% of the population of all members of Italian closed pension funds, and was more than twice larger than the second closed pension fund).<sup>1</sup>

These features are important for testing the impact of a financial education experiment aimed at workers with lower or average incomes.

### 3. Program and Experimental Design

Our design was aimed at testing experimentally the effect of a low-cost and scalable demographic and financial literacy program to a sample of factory and office workers among the members of Cometa. The main feature of the programme was a relatively short (less than 25 minutes) video lecture, administered in streaming. In our experimental design we used a questionnaire to test the effectiveness of the lecture in improving the understanding of demographic trends in life expectancy, of the basic finance concepts behind financial planning, and in increasing the willingness to acquire new information, as the first key component towards more conscious financial decisions. We also monitored heterogeneity of the effects across gender, age, education and culture range. Evidence on heterogeneity is relevant to determine if financial education efforts should be related to some initial conditions. We discuss in turn the video, the experimental design and the questionnaire that allowed us to assess the outcomes of the program.

#### The Video

The key element of the program is a video provided over the Internet to members of Cometa. The video started by giving evidence on the increase over time in life expectancy, and explaining qualitatively the existence of an inverse relationship between life expectancy at the time of retirement and the amount of monthly public pension payments. It then reminded that simulations of future pension payments could be implemented either through the Cometa website, or by reading the annual individual report received by Cometa. As a third step, in order to favour more conscious pension planning decisions, the video introduced the concepts of (i) the time value of money and the concept of compounding over time, (ii) the differences in expected return and risk

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<sup>1</sup> The size of pension fund in Italy was affected by a law, introduced in January 2007, that gave to employees the choice to invest their severance pay provision (known as *Trattamento di Fine Rapporto*, or TFR) in a pension plan (typically, an industry-wide pension fund such as Cometa) or kept in the firm. In absence of an explicit choice within the deadline, TFR would have been transferred to the pension fund and invested automatically in the lowest risk investment line.

between bonds and stocks, and (iii) the main characteristics of the four different investment lines available to Cometa participants, showing that further information could be found on Cometa website. Then the effect of inflation, the difference between nominal and real returns and the concept of portfolio diversification were discussed. Finally, the importance of conscious long-term financial planning decision was recalled. Some very simple, non-technical, questions asking to click on the appropriate answer of a multiple choice were inserted between the different sections, as a tool to keep the viewer of the video sufficiently active while watching.

## Experimental Design

In order to test the effect of the program, we adopted a randomized experiment design by administering the video first and the questionnaire after the video to the *treatment* group, and the questionnaire first and the video after the questionnaire to the *control* group.

The treatment and control groups were generated as follows:

- 1) The potential target was the subset of 140,000 (out of the total of 408,797) members who had given their e-mail address to the pension fund to receive periodic reports and communications. We were allowed to contact up to about 28,000 individuals for the experiment.
- 2) After excluding goldsmiths to ensure greater homogeneity, we decided to try to keep a reasonable balance between factory and office workers, males and females (despite females account for less than 20% of members), and among age intervals. We also tried to guarantee some diversification in terms of the macro-region of birth of the respondent (aiming for instance at having about 5% of individuals born outside Italy). We therefore stratified our potential sample along four dimensions: gender; type of job; educational level; region of birth, and selected randomly our target number of individuals within each stratum (bucket). We opted for giving access to the questionnaires to the treatment group only conditionally upon their watching the complete video. As a consequence, the size of the treatment group was chosen initially to be five times the size of the control group.
- 3) The treatment group received by mail an invitation with the link to access the short video, and it was possible to record the extent to which the video was accessed, also thanks to within-video questions. The treatment group was then asked, two weeks after having watched the video, to fill in a questionnaire about demographic and financial literacy and their behaviours in term of acquiring information for pension planning in the last two weeks.
- 4) The control group was administered the same questionnaire at the same time, without having had access to the video. All individuals in the control group who had fully completed the questionnaire were later offered to watch the video. The analysis has been conducting preserving full anonymity of respondents while being able, through a unique code, to reconstruct respondents' key characteristics such as gender, qualification (factory vs office workers), age and education.
- 5) The invitations with the links to either the video or the questionnaires have been sent gradually to the different buckets between June 2015 and early March 2016. The dataset comprises all the questionnaires completed within April 15, 2016.

- 6) We ended up with a final sample of 1436 completed questionnaire out of which 770 from the treatment group and 666 from the control group.
- 7) Six of the demographic and financial literacy questions have been also resubmitted in a second online questionnaire to those who have completed the video lecture and the first questionnaire, between July and September 2016. The median distance between the first invitation to attend the online video lecture and the second questionnaire is equal to 8.6 months, with 90% of values between 4 and 12.6 months.

### The Questionnaire

The questionnaire (see Box 1) was structured in two blocks, respectively devoted to demographic and financial literacy and to attitudes and behaviours. In the former, three questions were asked on life expectancy at 65 years, its evolution over time and the relation between increasing life expectancy at 65 and expected pension payments. Nine financial literacy questions were then asked based on the basic and on the advanced literacy questions from Van Rooji, Lusardi and Alessie (2011b). In particular the questions on numeracy, inflation, interest compounding, the risk/return profile for savings accounts, stocks and bonds over long horizons, the relationship between expected return and risk, and the effects of diversification.

The second section (see Box 2) investigated behaviours and attitudes. This was done by asking whether in the past two weeks the respondent had (2.1a) looked for information on savings and pensions, (2.1b) talked about savings and pensions in his/her family, (2.1c) talked about savings and pensions with colleagues, (2.1d) tried to estimate his/her expected pension using Cometa website or reading Cometa annual report, and (2.1e) looked for information on the characteristics of the different Cometa investment lines (“comparti”).

We were of course particularly interested into differences in behaviours between treated and control individuals, both in terms of acquisition of information and efforts to estimate their expected pension were concerned (questions 2.1a, 2.1d and 2.1e). We also added two questions to control for possible information received by INPS, the national social security service.

The question resubmitted in a second online questionnaire to those who have completed the video lecture and the first questionnaire are six of the demographic and financial literacy questions (namely, a2-change in life expectancy, a3-life expectancy and pension, a4-numeracy, a5-inflation, a6-interest compounding, a10-diversification 1).

## Box1: Demographic and financial literacy questions

**a1. Life expectancy - In Italy, today, a man that is already 60 years old, could expect to live until...** (1) 79 years or more, (2) between 76 and 78 years, (3) between 73 and 75 years, (4) 72 years or less, (5) Do not know

**a2. Evolution of life expectancy - A man or a woman that are 60 years old in Italy, with respect to 20 years ago, can expect to live:** (1) At least 2 years less than a 60-year-old person that lived 20 years ago, (2) Between 1 and 2 years less than a 60-year-old person that lived 20 years ago, (3) More or less as much as a 60-year-old person that lived 20 years ago, (4) Between 1 and 2 years more than a 60-year-old person that lived 20 years ago, (5) At least 2 years more than a 60-year-old person that lived 20 years ago, (6) Do not know

**a3. Life expectancy and pension - Given the same quantity of contribution years and of paid contributions, if life expectancy increases, which effect happens on the public monthly pension that a retired person can expect to receive?** (1) If life expectancy increases, the monthly pension increases, (2) If life expectancy increases, the monthly pension decreases, (3) The monthly pension remains the same, because given the current law, it is independent from the expectation of life, (4) Do not know

**a4. Numeracy - Suppose you had €100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow:** (1) More than €102, (2) Exactly €102, (3) Less than €102, (4) Do not know

**a5. Inflation - Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?** (1) More than today, (2) Exactly the same, (3) Less than today, (4) Do not know

**a6. Interest compounding - Suppose you had €100 euro in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?**

(1) More than €200, (2) Exactly €200, (3) Less than €200, (4) Do not know

**a7. Expected return ranking - Considering a long time period (for example 10 or 20 years), which asset normally provides the highest return?** (1) Saving accounts, (2) Stocks, (3) Bonds, (4) Do not know

**a8. Risk ranking - Normally, which asset displays the highest fluctuations over time?** (1) Saving accounts, (2) Stocks, (3) Bonds, (4) Do not know

**a9. Risk-return relationship - An investment that has a high expected return is more likely to have a high risk: true or false?** (1) True, (2) False, (3) Do not know

**a10. Diversification 1 - If you invest 1000 euro in stocks, is it riskier to invest 1000 euro in only one stock or 100 euro in 10 different stocks?** (1) It is riskier to invest 1000 euro in only one stock, (2) It is riskier to invest 100 euro in 10 different stocks, (3) Do not know

**a11. Diversification 2 - When an investor diversifies his investment among different assets, does the risk of losing money...** (1) increase, (2) stay the same, (3) decrease, (4) Do not know



## Box 2 – Questions on Behaviour

- b1. Over the last two weeks, I looked for information on savings and pensions: (1) Yes, (2) No
- b2. Over the last two weeks, I discussed savings and pensions with my family members: (1) Yes, (2) No
- b3. Over the last two weeks, I discussed savings and pensions with my colleagues: (1) Yes, (2) No
- b4. Over the last two weeks, I tried to estimate my expected future pension through the Cometa website or reading my annual personal report from Cometa: (1) Yes, (2) No
- b5. Over the last two weeks, I looked for information about the investment lines of the Cometa fund: (1) Yes, (2) No

## 4. Results

### 4.1 Descriptive Statistics

In the light of the description of our experimental design provided in the previous section, Table 1 provides the relevant evidence to evaluate whether our randomized treatment (the video lecture) actually depends on any observable individual characteristics. Our final sample contains a total of 1436 individuals out of which 770 were treated and 666 were not. Table 1 reports mean values of individual characteristics for the total population and for the two groups and a test for the significance of their difference. We consider age, sex, place of birth and education along with variables describing the choices of individuals with respect to their contribution to the different investment lines made available by Cometa. In particular, we have information on the years of voluntary contribution, the choice of the investment line, the choice of contributing additional deposits and the exercise of the option of asking anticipated advances for exceptional motives. Overall, the evidence does not lead to the rejection of the null of randomization although there are some exceptions. In particular, the share of “blue collar” workers in the control group is higher; the share of individuals with university degree is also slightly higher; (which implies that the percentage of white collar workers with university degree is significantly higher). There is also some evidence that members of the control group tilted their choice in favor of safer and lower return strategies with respect to riskier choices.

Our regression analysis will be informed by this evidence and controls for all relevant characteristics will be included.

## 4.2 Regression Analysis of the Effect of the Treatment

To assess statistically the effect of our treatment we consider a difference estimator within a system of linear probability equations. Given the availability of 1436 answers to 16 questions, our baseline evidence is based on the estimation of the following system of linear probability models:

$$Y_i^1 = \beta_0^1 + \beta_1^1 X_i + \sum_{j=1}^{23} \beta_{j+1}^1 W_i + u_i^1$$

$$Y_i^2 = \beta_0^2 + \beta_1^2 X_i + \sum_{j=1}^{23} \beta_{j+1}^2 W_i + u_i^2$$

...

$$Y_i^{16} = \beta_0^{16} + \beta_1^{16} X_i + \sum_{j=1}^{23} \beta_{j+1}^{16} W_i + u_i^{16}$$

where the  $Y_i^k$  are binary variables that capture the correct answer to k-th of the 16 questions in the survey, the  $X_i$  separates the control group from the treatment group and the  $W_i$  are the controls for the 23 characteristics analyzed in Table 1. We do not impose any panel restrictions, allowing both the unconditional probability of answering correctly and the treatment effect to be different in each of our questions, given their different nature. All controls that have a non-dummy nature are demeaned so that the constant in each equation can be interpreted as the unconditional probability of giving the correct answer. The first group of questions is aimed at understanding the effect of the treatment on the demographic knowledge, the second group on the financial knowledge and the third group on behavior/attitude. The linear probability model is estimated at the cost of losing the possibility of sensibly approximating the nonlinear population regression function. In practice, the relevance of this potential cost depends on the number of extreme values in the regressors. We have checked the robustness of the results based on the linear probability model by considering an alternative *logit* specification, which confirms the baseline evidence.

Results of the system estimation are reported in Table 2. The statistical evidence for the effect of the treatment is uniform across all questions, with only three exceptions that refer to two questions on behavior and attitudes and a question on diversification. Question b2 aimed at knowing if the subject has discussed savings and pension in the family over the last two weeks and question b3 aimed at knowing if the subject has discussed saving and pensions with colleagues. In question a10 on diversification the unconditional probability of giving the correct answer stands as high as .947.

Interestingly the effect of the treatment is not of the same size across different questions and it shows up more strongly in three questions related to basic financial literature and one question related to the effect of an increase of life expectancy on the received monthly pension. The maximum impact of the treatment stands at an increase of .21 in the probability of looking for information on the different investment lines of the Cometa fund.

The significance of controls broadly reflects the patterns in the data traced by the descriptive statistics.

It is interesting to analyze results disaggregating by the different sections of our survey.

#### **4.2.1 Demographic Literacy and Pension Payments (Questions 1-3)**

The first two questions of our survey are aimed at evaluating the knowledge of expected residual life at 65 years and its evolution over the last 20 years, while the third question investigates the knowledge of the relation between life expectancy and the expected pension payments.

In the first two questions, the average probability of answering correctly is 0.574 and 0.716 respectively, this probability is little affected by the controls and the treatment raises it significantly by 0.056 and 0.078. In the third question the average probability of answering correctly is 0.295 which is raised by 0.217 in case of the presence of a university degree and by 0.173 by the treatment. Interestingly, the null that the effect of the treatment is not significantly different from that of the university degree cannot be rejected. The third question is also particularly relevant since it checks whether workers have understood or not that after a series of public pension reforms the monthly amount of the public pension at retirement is calculated based on life expectancy at the time of retirement, using mortality tables that are automatically updated. Hence, an increase in life expectancy translates into a lower monthly public pension, everything else being equal. Understanding this critical feature of the public pension system may help motivating individuals to improve their financial planning for retirement.

#### **4.2.2 Financial Literacy: interest compounding, inflation, risk, returns and diversification (Questions 4-11)**

Questions 4-6 are designed to assess the basic financial literacy with respect to compounding and nominal versus real interest rates. We assess numeracy and interest compounding ability (respectively in question 4 and 6), while question 5 investigates the ability to distinguish between nominal and real returns. In all these questions we use a wording very similar to the ones devised for the Health and Retirement Study (HRS) by Lusardi and Mitchell (2006). Question 7 and 8 assess the knowledge of the first two moments of the distribution of returns on stock, bonds and saving accounts, question 9 concentrates on the risk-return relationship, while question 10 and 11 deal with diversification and its impact on risk.

An interesting benchmark to evaluate the answers to all these questions is the one provided by the financial literacy tests included in the 2006 and 2008 SHIW (Survey on Household Income and Wealth) run by the Bank of Italy. Every two years, through the Survey on Household Income and Wealth (SHIW), the Bank of Italy collects detailed data on household demographics, consumption, income, and wealth for a representative sample of the Italian population (<http://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-impres/bilanci-famiglie/documentazione/index.html>). In the 2006 and 2008 waves an extra module on financial literacy was given about half of the sample (3,992 households whose head was born on an even year). In this module there were questions on interest compounding, inflation, risk diversification (based as our question 10, on the choice between an individual stock and a stock mutual fund) and stocks (Imagine that you have only equity funds and the stock market price fall. Are you i) Better off ii) Worse off iii) As well off as before iv) don't know).

The analysis of the answers conducted by Fornero and Monticone(2011) reveals that 40 per cent of the interviewed gives a correct answer to the interest compounding question. The share of correct answers raises to 60 per cent in the real vs nominal interest rate question; 45 % of the whole sample indicated correctly that holding shares of a single company is riskier than diversifying across several companies. Finally, 51 per cent was able to correctly pin down the effect of a fall in the stock on equity funds. The statistical evidence indicated a gender gap in financial literacy, a monotonically increasing relationship between the level of education and financial literacy and significant regional disparities between the North and the South of the country.

Our evidence show that the level of financial literacy in our sample is in general higher with respect to that of the Banca of Italy surveys and the treatment uniformly raises the probability of answering correctly. Interestingly the only financial question in which the probability of answering correctly is lower than 0.5 independently from the treatment is the one on the long-run returns from investing in shares. The comparison of our data with those of the Bank of Italy surveys suggest that the financial crisis has increased the interest of the public for basic financial concepts but it generated a pessimistic view on stock market returns. We also find statistical evidence for a gender gap, a monotonically increasing relationship between the level of education and financial literacy and significant regional disparities between the North and the South of the country.

In particular, in questions 4-6 , that assess the basic financial literacy with respect to compounding and nominal versus real interest rates, the average probability of answering correctly is 0.7 which is raised by 0.12 per cent in case of the presence of a university degree and by 0.11 per cent by the treatment. Again the null that the treatment effect is not significantly different from that of a university degree cannot be rejected. The particularly strong effect in question 6 that deals with capturing the effects of discrete compounding can be particularly relevant, since the failure in understanding it may lead young individuals to underestimate the risk that maintaining very low risk, low return investments despite a long investment horizons may result in insufficient payments from the industry pension fund after retirement.

Question 7-11 assess financial literacy with respect to expected returns and risk. Here estimates for questions 7 that concentrates on expected returns are very different from those for the other three questions that concentrate on risk. In question 7 which assesses the knowledge about long run returns the average probability of answering correctly is slightly below 0.5 and it is drastically raised by about 0.2 per cent by the treatment. Answers on the risk of different types of investment produce a much higher unconditional probability of being correct, slightly above 0.85. The effect of the treatment is still significant here, albeit small at an average marginal effect 0.03. The treatment is not significant in the case of question 10 (which is on the impact of diversification on risk) where the probability of answering correctly unconditionally stands at .945. Interestingly the location dummy has a significant effect in that respondent of the South have a lower probability of assessing correctly risk (with a reduction in probability of answering correctly that ranges from -0.05 to -0.08 being always significantly different from zero).

#### **4.2.3 Attitudes and Behaviour (Questions 12-16)**

Questions 12-16 concentrate on attitudes and behaviour, assessing, with reference to the behavior in the last two weeks, the general interest for saving and pensions (Q12), the frequency of discussion on savings and pensions with family members(Q13) and colleagues(Q14), whether the

respondent had tried to estimate his or her future pension through the Cometa website or the Cometa annual individual report (Q15) and whether the respondent had looked for information on the different investment lines offered by the Cometa fund (Q16). The answers reveal an interesting pattern: the treatment does not push individuals to discuss about pensions within the family or with colleagues, but it significantly and strongly pushes to look for more information on pensions in general, on the specific forecast of pension payments that the individual may obtain in the future and on the differences among the investment lines of the pension fund. The remarkable effect of the treatment in moving individuals to look for information about the four different investment lines of Cometa (the coefficient is 0.221, while the constant is 0.131) in the two weeks after the video is particularly important considering the tendency of many workers to remain in the default investment line, with a (non-)choice that is often likely to hide the unwillingness to gather information or the inability to take a conscious decision for the long-run risk-return profile of their pension investment.

### 4.3 Does the Effect of the Treatment Depend on Individual Characteristics ?

The baseline results discussed in the previous section provide confirmatory evidence of previous results on financial literacy in Italy and new evidence of the statistical impact of the nudging action implemented in our experiments. In particular, we find statistical evidence for a gender gap, a monotonically increasing relationship between the level of education and financial literacy and significant regional disparities between the North and the South of the country and a uniformly significant coefficient on the treatment for nearly all the questions in our survey. In the light of this evidence, it is interesting to assess if the effect of the treatment is related to the heterogeneous initial level of literacy. To this end, we estimate a richer specification by augmenting our initial system with interactions between the treatment and the significant individual dummies. The results of the SURE estimation of the extended linear probability model are reported in Table 3.

Our results strongly indicate that the effect of the treatment is not affected by the individual characteristics that generate heterogeneity in financial literacy. In fact, the interaction between treatment and the dummies that capture heterogeneity due to gender, education, and geographical location are jointly not significantly different from zero. Moreover, if we consider the four cases in which an interaction is significant at least at the 5% level (university degree in questions 1 and 6, South in question 8 and white collar in question 9), the effect goes in the direction of *reducing* rather than increasing the literacy gap among the subgroups having different ex ante levels of literacy. The only case in which the positive effect of the treatment is more positive for people with a university degree is on the behavior question checking whether more information has been looked for about the different investment lines of the fund, but even there the treatment effect remains significant also for the overall sample. Apart from these very limited exceptions, nudging seem to work uniformly for agents heterogeneous with respect to many characteristics and with a very heterogeneous pre-treatment level of financial literacy.

### 4.4 Does the Effect of the Treatment Last in Time ?

To assess the lasting effect of our nudging experiment we exploited the evidence from a second questionnaire submitted to be completed online to questionnaire to those who have completed the

video lecture and the first questionnaire about nine months after the first one. The second questionnaire focused on a subset of questions, namely six of the demographic and financial literacy questions (namely, a2-change in life expectancy, a3-life expectancy and pension, a4-numeracy, a5-inflation, a6-interest compounding, a10-diversification 1) . We rerun our model with interactions using as treatment group the respondents to the second questionnaire. The evidence (see Table 4) rejects the null of a temporary effect of the nudging experiment. For five of the six questions the impact of the treatment is statistically significant, the only exception being the question on life expectancy. Interestingly the long-term effect of the treatment is more uniform than the short-run impact. We also checked whether the distance between the invitation to participate to the video and the completion of the second questionnaire has an impact on the probability of answering correctly, but for the five questions for which the treatment proved to be significant even in the follow up questionnaire the interaction between the treatment and the demeaned distance between the video and the second questionnaire is not statistically significant. We therefore do not find evidence of a time decay of the effects of the treatment on these five questions.

## 5. Conclusions

In this paper we have introduced a new program, *Finlife* (Financial Education and Planning for a Long Life), discussed its implementation and experimental evaluation. Our approach was based on 1) an instructional video and materials provided through the Internet; 2) an experimental design that explicitly allows to evaluate the impact of the instructional video and materials on financial and demographic literacy, as well as short-term behavioral changes; 3) a follow-up to assess the stability of some of the outcomes in stage 2.

Given its costs, *Finlife* was designed to be an easily scalable approach to increase financial and demographic literacy. Given its ease of access and low complexity, *Finlife* was designed consistently with the ‘nudge’ approach that has pushed ideas in behavioral economics. The importance of such an experiment is clear if we consider that even among pension fund members the percentage of individuals who accept to invest in an investment line with more than 15% of stocks was below 4% at the end of 2014, and that only a small percentage has proved to have understood one cornerstone of one of the pension reforms in Italy, that has automatically linked the amount of pension payments for a retiree to average life expectancy at the age of retirement.

Our results show that *Finlife* delivered a substantially and statistically significant increase in financial and demographic literacy, as well as a push in behaviors involving a greater attention to financial markets and choices related to financial planning. Moreover, we provide evidence that the treatment effect was largely homogeneous among subgroups, proving to be effective also for subgroups with a lower ex ante level of financial and demographic literacy, and sometimes reducing the initial gap among subgroups. Finally, on a subsample of questions we find evidence that the treatment effect has remained significant even months after the treatment.

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Table 1: Descriptive Statistics

Sample Size: **1436**, Treated Group Size: **770**, Control Group Size: **666**

| Characteristic                                    |  | Sample | Control | Treated | Difference | P-Value <sup>1</sup> |
|---|--|--------|---------|---------|------------|----------------------|
| <b>Age</b>  |  | 44.48  | 43.84   | 45.03   | -1.19**    | 0.0103               |
| <b>Occupation</b>                                 | % of "Blue Collar"                           | 40.04% | 45.95%  | 34.94%  | 11.01%***  | 0.0000               |
| <b>Sex</b>  | % of Males                                   | 70.68% | 69.52%  | 71.69%  | -2.17%     | 0.3683               |
| <b>Place of birth</b>                             | Northern Italy                               | 51.18% | 50.30%  | 51.95%  | -1.65%     | 0.5337               |
|   | Central Italy                                | 23.54% | 22.82%  | 24.16%  | -1.33%     | 0.5530               |
|   | Southern Italy/Islands                       | 20.68% | 21.62%  | 19.87%  | 1.75%      | 0.4142               |
|   | Abroad                                       | 4.60%  | 5.26%   | 4.03%   | 1.23%      | 0.2676               |
| <b>Educational Qualification</b>                  | Univ. Degree                                 | 23.33% | 20.12%  | 26.10%  | -5.98%***  | 0.0075               |
|   | High School                                  | 52.92% | 52.55%  | 53.25%  | -0.69%     | 0.7929               |
|   | Compulsory Education                         | 20.19% | 23.42%  | 17.40%  | 6.02%***   | 0.0046               |
|   | No School                                    | 3.55%  | 3.90%   | 3.25%   | 0.65%      | 0.5026               |
| <b>Years of Paid Contributions</b>                |  | 12.62  | 12.39   | 12.82   | -0.43*     | 0.0760               |
| <b>Investment line</b>                            | "Monetario Plus" (Money market +)            | 20.68% | 25.23%  | 16.75%  | 8.47%***   | 0.0001               |
|   | "Sicurezza" (Safety)                         | 14.28% | 14.86%  | 13.77%  | 1.09%      | 0.5532               |
|   | "Reddito" (Income)                           | 48.47% | 45.95%  | 50.65%  | -4.7%*     | 0.0754               |
|   | "Crescita" (Growth)                          | 16.57% | 13.96%  | 18.83%  | -4.87%**   | 0.0134               |
| <b>Extra individual contributions to the fund</b> | No   | 97.21% | 97.00%  | 97.40%  | -0.40%     | 0.6416               |
|   | Occasional Extra Contributions               | 2.72%  | 2.85%   | 2.60%   | 0.25%      | 0.7667               |
|   | Regular Extra Contributions                  | 0.07%  | 0.15%   | 0%      | 0.15%      | 0.2824               |
| <b>Anticipations</b>                              | Total Anticipations                          | 0.39   | 0.43    | 0.36    | 0.07       | 0.1275               |
|   | Anticipation for purchase of the first house | 0.06   | 0.06    | 0.06    | 0          | 0.9527               |
|   | Anticipation for restoring the first house   | 0.02   | 0.02    | 0.01    | 0.01       | 0.2612               |
|   | Anticipations for Sanitary Expenses          | 0.02   | 0.03    | 0.02    | 0.01       | 0.4271               |
|   | Anticipations for other reasons              | 0.29   | 0.32    | 0.26    | 0.06       | 0.1493               |

1: Two-sample t-test with equal variances

\*: indicates that the difference is significant at a 10% level of confidence

\*\*: indicates that the difference is significant at a 5% level of confidence

\*\*\*: indicates that the difference is significant at a 1% level of confidence

Table 2 - Seemingly unrelated regression for baseline model, first questionnaire

| VARIABLES    | a1                      | a2                      | a3                      | a4                       | a5                      | a6                      | a7                     | a8                     | a9                     | a10                    | a11                    | b1                        | b2                       | b3                      | b4                       | b5                      |
|--------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
|              | Life Expectancy         | Evolution of L.E.       | L.E. and Pensions       | Numeracy                 | Inflation               | Interest Compound       | Expected Returns       | Risk                   | Risk-Returns           | Diversification 1      | Diversification 2      | Info on pensions          | Discussion Family        | Discussion Colleagues   | Estimate my pension      | Info on invest.lines    |
| Constant     | 0.574***<br>(0.0492)    | 0.716***<br>(0.0408)    | 0.295***<br>(0.0481)    | 0.734***<br>(0.0358)     | 0.808***<br>(0.0296)    | 0.534***<br>(0.0446)    | 0.499***<br>(0.0465)   | 0.876***<br>(0.0237)   | 0.930***<br>(0.0246)   | 0.947***<br>(0.0208)   | 0.782***<br>(0.0302)   | 0.338***<br>(0.0494)      | 0.517***<br>(0.0502)     | 0.595***<br>(0.0494)    | 0.207***<br>(0.0458)     | 0.131***<br>(0.0456)    |
| TREATMENT    | 0.0559**<br>(0.0261)    | 0.0780***<br>(0.0217)   | 0.173***<br>(0.0255)    | 0.119***<br>(0.0190)     | 0.0524***<br>(0.0157)   | 0.174***<br>(0.0237)    | 0.196***<br>(0.0247)   | 0.0342***<br>(0.0126)  | 0.0537***<br>(0.0130)  | 0.0153<br>(0.0111)     | 0.0568***<br>(0.0160)  | 0.121***<br>(0.0262)      | -0.0121<br>(0.0266)      | -0.0358<br>(0.0262)     | 0.169***<br>(0.0243)     | 0.221***<br>(0.0242)    |
| WHITE COLLAR | 0.0571*<br>(0.0319)     | 0.0531**<br>(0.0265)    | 0.0232<br>(0.0312)      | 0.0580**<br>(0.0232)     | 0.0631***<br>(0.0192)   | 0.158***<br>(0.0290)    | 0.00190<br>(0.0302)    | 0.0555***<br>(0.0154)  | 0.0316**<br>(0.0159)   | 0.0138<br>(0.0135)     | 0.0529***<br>(0.0196)  | 0.0273<br>(0.0320)        | -0.000439<br>(0.0326)    | 0.0237<br>(0.0321)      | 0.0287<br>(0.0297)       | 0.00458<br>(0.0296)     |
| FEMALE       | 0.0351<br>(0.0289)      | 0.0110<br>(0.0240)      | -0.0355<br>(0.0283)     | -0.0413**<br>(0.0211)    | -0.0404**<br>(0.0174)   | -0.126***<br>(0.0263)   | -0.0240<br>(0.0274)    | -0.0205<br>(0.0140)    | -0.0538***<br>(0.0144) | -0.0127<br>(0.0123)    | -0.0226<br>(0.0178)    | -0.0320<br>(0.0291)       | 0.0381<br>(0.0295)       | -0.0869***<br>(0.0291)  | -0.0360<br>(0.0270)      | -0.0468*<br>(0.0268)    |
| AGE          | 0.00277<br>(0.00198)    | 0.00360**<br>(0.00164)  | -0.000293<br>(0.00193)  | -0.00466***<br>(0.00144) | 0.00367***<br>(0.00119) | 0.00296*<br>(0.00180)   | -2.61e-05<br>(0.00187) | -0.00127<br>(0.000954) | 0.00108<br>(0.000988)  | 0.00133<br>(0.000838)  | 0.00251**<br>(0.00121) | 0.00664***<br>(0.00199)   | 0.00392*<br>(0.00202)    | 0.00516***<br>(0.00199) | 0.00176<br>(0.00184)     | -0.00183<br>(0.00183)   |
| AGE_SQUARED  | -3.12e-05<br>(0.000162) | -0.000205<br>(0.000134) | -0.000111<br>(0.000158) | -2.54e-05<br>(0.000118)  | 7.38e-05<br>(9.75e-05)  | -2.25e-05<br>(0.000147) | 9.78e-05<br>(0.000153) | 3.38e-05<br>(7.80e-05) | 7.19e-05<br>(8.08e-05) | 1.49e-06<br>(6.85e-05) | 4.01e-05<br>(9.92e-05) | 0.000446***<br>(0.000162) | 0.000391**<br>(0.000165) | -0.000251<br>(0.000163) | 0.000372**<br>(0.000151) | 0.000260*<br>(0.000150) |
| CENTRE       | 0.0271<br>(0.0324)      | -0.0106<br>(0.0269)     | -0.0767**<br>(0.0317)   | -0.0187<br>(0.0236)      | -0.0154<br>(0.0195)     | -0.00392<br>(0.0294)    | -0.0109<br>(0.0307)    | -0.00333<br>(0.0156)   | -0.00889<br>(0.0162)   | -0.0168<br>(0.0137)    | -0.0295<br>(0.0199)    | -0.0260<br>(0.0325)       | -0.00555<br>(0.0331)     | 0.0466<br>(0.0326)      | 0.00534<br>(0.0302)      | 0.0461<br>(0.0300)      |
| SOUTH        | 0.00639<br>(0.0338)     | -0.0420<br>(0.0281)     | -0.0423<br>(0.0331)     | 0.00169<br>(0.0246)      | -0.0411**<br>(0.0204)   | -0.0371<br>(0.0307)     | -0.0406<br>(0.0320)    | -0.0583***<br>(0.0163) | -0.0562***<br>(0.0169) | -0.0445***<br>(0.0143) | -0.0839***<br>(0.0208) | -0.00187<br>(0.0340)      | 0.0110<br>(0.0345)       | 0.0407<br>(0.0340)      | 0.00826<br>(0.0315)      | 0.0960***<br>(0.0314)   |
| UNIV DEGREE  | -0.0248<br>(0.0488)     | 0.0666<br>(0.0405)      | 0.217***<br>(0.0477)    | 0.0998***<br>(0.0355)    | 0.0651**<br>(0.0294)    | 0.127***<br>(0.0443)    | 0.117**<br>(0.0462)    | 0.0288<br>(0.0236)     | 0.0222<br>(0.0244)     | 0.0454**<br>(0.0207)   | 0.139***<br>(0.0300)   | 0.0329<br>(0.0490)        | -0.0693<br>(0.0498)      | -0.119**<br>(0.0491)    | -0.0287<br>(0.0455)      | -0.0381<br>(0.0453)     |
| HS DEGREE    | -0.0247<br>(0.0374)     | 0.0178<br>(0.0310)      | 0.0733**<br>(0.0365)    | 0.0286<br>(0.0272)       | 0.00491<br>(0.0225)     | -0.00289<br>(0.0339)    | -0.000404<br>(0.0354)  | 0.00880<br>(0.0180)    | -0.0268<br>(0.0187)    | 0.0183<br>(0.0158)     | 0.0841***<br>(0.0229)  | 0.0108<br>(0.0375)        | -0.0277<br>(0.0381)      | -0.0126<br>(0.0376)     | 0.0296<br>(0.0348)       | -0.00698<br>(0.0346)    |
| NO_SCHOOL    | 0.0188<br>(0.0763)      | 0.0227<br>(0.0633)      | 0.0934<br>(0.0746)      | 0.0946*<br>(0.0555)      | 0.0472<br>(0.0460)      | -0.0438<br>(0.0692)     | -0.0379<br>(0.0722)    | -0.0205<br>(0.0368)    | -0.0300<br>(0.0381)    | -0.0213<br>(0.0323)    | 0.0543<br>(0.0468)     | -0.0638<br>(0.0766)       | 0.00134<br>(0.0778)      | 0.0122<br>(0.0767)      | -0.0423<br>(0.0711)      | -0.0233<br>(0.0707)     |
| Observations | 1,436                   | 1,436                   | 1,436                   | 1,436                    | 1,436                   | 1,436                   | 1,436                  | 1,436                  | 1,436                  | 1,436                  | 1,436                  | 1,436                     | 1,436                    | 1,436                   | 1,436                    | 1,436                   |
| R-squared    | 0.021                   | 0.039                   | 0.092                   | 0.083                    | 0.089                   | 0.143                   | 0.109                  | 0.060                  | 0.062                  | 0.040                  | 0.112                  | 0.050                     | 0.020                    | 0.047                   | 0.056                    | 0.074                   |

Other control variables are: a dummy for the birth outside the country, dummies for investment lines, for voluntary extra contributions and for voluntary change of investment line, years of contribution in deviation from their mean, the number of early withdrawals in deviation from their mean. Standard errors in parentheses below coefficients.

\* p<0.1; \*\* p<0.5; \*\*\* p<0.01.

Table 3 - Seemingly unrelated regression with interaction variables, first questionnaire

| VARIABLES            | a1                      | a2                      | a3                      | a4                       | a5                      | a6                    | a7                     | a8                     | a9                     | a10                   | a11                    | b1                        | b2                       | b3                       | b4                       | b5                     |
|----------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-----------------------|------------------------|------------------------|------------------------|-----------------------|------------------------|---------------------------|--------------------------|--------------------------|--------------------------|------------------------|
|                      | Life Expectancy.        | Evolution of L.E.       | L.E. and Pensions       | Numeracy                 | Inflation               | Interest Compound     | Expected Returns.      | Risk                   | Risk-Returns           | Diversification 1     | Diversification 2      | Info on pensions          | Discussion Family        | Discussion Coll.         | Estimate my pension      | Info on invest.lines   |
| Constant             | 0.576***<br>(0.0523)    | 0.696***<br>(0.0434)    | 0.299***<br>(0.0511)    | 0.726***<br>(0.0381)     | 0.801***<br>(0.0315)    | 0.516***<br>(0.0472)  | 0.526***<br>(0.0495)   | 0.880***<br>(0.0252)   | 0.923***<br>(0.0261)   | 0.935***<br>(0.0221)  | 0.779***<br>(0.0320)   | 0.332***<br>(0.0526)      | 0.503***<br>(0.0534)     | 0.629***<br>(0.0525)     | 0.221**<br>(0.0487)      | 0.154***<br>(0.0483)   |
| TREATMENT            | 0.0465<br>(0.0461)      | 0.121***<br>(0.0383)    | 0.168***<br>(0.0451)    | 0.133***<br>(0.0336)     | 0.0717***<br>(0.0278)   | 0.199***<br>(0.0416)  | 0.133***<br>(0.0436)   | 0.0300<br>(0.0222)     | 0.0769***<br>(0.0230)  | 0.0386**<br>(0.0195)  | 0.0653**<br>(0.0283)   | 0.131***<br>(0.0464)      | 0.0187<br>(0.0471)       | -0.107**<br>(0.0463)     | 0.139***<br>(0.0430)     | 0.173***<br>(0.0426)   |
| TREATMENT_UNIV DEGR  | -0.152**<br>(0.0686)    | -0.0921<br>(0.0570)     | -0.0779<br>(0.0671)     | -0.0581<br>(0.0500)      | 0.0143<br>(0.0414)      | -0.254***<br>(0.0620) | -0.0298<br>(0.0650)    | -0.0471<br>(0.0331)    | 0.0293<br>(0.0342)     | -0.0408<br>(0.0290)   | -0.0687<br>(0.0421)    | 0.0126<br>(0.0690)        | -0.0296<br>(0.0701)      | 0.0862<br>(0.0690)       | 0.0532<br>(0.0640)       | 0.207***<br>(0.0634)   |
| TREATMENT_SOUTH      | 0.0622<br>(0.0639)      | -0.0102<br>(0.0531)     | 0.0191<br>(0.0626)      | 0.0112<br>(0.0466)       | -0.00166<br>(0.0386)    | -0.0109<br>(0.0578)   | -0.00695<br>(0.0605)   | 0.0668**<br>(0.0308)   | 0.0154<br>(0.0319)     | 0.00208<br>(0.0271)   | 0.0671*<br>(0.0392)    | -0.0256<br>(0.0643)       | 0.0254<br>(0.0654)       | 0.0711<br>(0.0643)       | -0.0330<br>(0.0596)      | -0.0481<br>(0.0591)    |
| TREATMENT_FEMALE     | -0.0187<br>(0.0570)     | 0.00719<br>(0.0473)     | 0.0549<br>(0.0557)      | -0.0332<br>(0.0415)      | 0.0223<br>(0.0344)      | -0.0531<br>(0.0515)   | 0.0257<br>(0.0539)     | 0.0156<br>(0.0275)     | 0.0436<br>(0.0284)     | -0.0457*<br>(0.0241)  | -0.0134<br>(0.0349)    | -0.0173<br>(0.0573)       | -0.0227<br>(0.0582)      | 0.0360<br>(0.0573)       | 0.0157<br>(0.0531)       | 0.0326<br>(0.0526)     |
| TREATMENT_WHITE COLL | 0.0618<br>(0.0590)      | -0.0374<br>(0.0490)     | 0.00328<br>(0.0577)     | 0.0106<br>(0.0429)       | -0.0486<br>(0.0356)     | 0.0858<br>(0.0533)    | 0.107*<br>(0.0558)     | -0.00605<br>(0.0284)   | -0.0775***<br>(0.0294) | -0.00103<br>(0.0250)  | -0.00453<br>(0.0362)   | -0.00533<br>(0.0593)      | -0.0376<br>(0.0603)      | 0.0434<br>(0.0593)       | 0.0343<br>(0.0550)       | 0.00148<br>(0.0545)    |
| WHITE COLLAR         | 0.0211<br>(0.0447)      | 0.0710*<br>(0.0371)     | 0.0225<br>(0.0438)      | 0.0498<br>(0.0326)       | 0.0897***<br>(0.0270)   | 0.106***<br>(0.0404)  | -0.0530<br>(0.0424)    | 0.0584***<br>(0.0216)  | 0.0744***<br>(0.0223)  | 0.0114<br>(0.0189)    | 0.0533*<br>(0.0274)    | 0.0295<br>(0.0450)        | 0.0175<br>(0.0457)       | 0.00452<br>(0.0450)      | 0.0126<br>(0.0417)       | 0.00940<br>(0.0413)    |
| FEMALE               | 0.0464<br>(0.0420)      | 0.00586<br>(0.0349)     | -0.0648<br>(0.0411)     | -0.0234<br>(0.0306)      | -0.0544**<br>(0.0253)   | -0.0939**<br>(0.0379) | -0.0326<br>(0.0397)    | -0.0306<br>(0.0202)    | -0.0808***<br>(0.0209) | 0.0114<br>(0.0178)    | -0.0173<br>(0.0257)    | -0.0225<br>(0.0422)       | 0.0479<br>(0.0429)       | -0.106**<br>(0.0422)     | -0.0421<br>(0.0392)      | -0.0630<br>(0.0388)    |
| AGE                  | 0.00280<br>(0.00199)    | 0.00341**<br>(0.00165)  | -0.000205<br>(0.00195)  | -0.00476***<br>(0.00145) | 0.00364***<br>(0.00120) | 0.00264<br>(0.00180)  | 0.000186<br>(0.00188)  | -0.00113<br>(0.000959) | 0.00111<br>(0.000991)  | 0.00117<br>(0.000842) | 0.00255**<br>(0.00122) | 0.00654***<br>(0.00200)   | 0.00382*<br>(0.00203)    | 0.00562***<br>(0.00200)  | 0.00185<br>(0.00186)     | -0.00160<br>(0.00184)  |
| AGE_SQUARED          | -2.10e-05<br>(0.000162) | -0.000187<br>(0.000135) | -0.000113<br>(0.000159) | -132e-05<br>(0.000118)   | 7.30e-05<br>(9.79e-05)  | 175e-05<br>(0.000147) | 8.65e-05<br>(0.000154) | 2.87e-05<br>(7.82e-05) | 6.56e-05<br>(8.09e-05) | 161e-05<br>(6.87e-05) | 4.35e-05<br>(9.96e-05) | 0.000452***<br>(0.000163) | 0.000400**<br>(0.000166) | -0.000286*<br>(0.000163) | 0.000362**<br>(0.000151) | 0.000230<br>(0.000150) |
| CENTRE               | 0.0293<br>(0.0324)      | -0.0112<br>(0.0269)     | -0.0758**<br>(0.0317)   | -0.0185<br>(0.0236)      | -0.0167<br>(0.0195)     | -0.000611<br>(0.0293) | -0.00726<br>(0.0307)   | -0.00329<br>(0.0156)   | -0.0110<br>(0.0161)    | -0.0170<br>(0.0137)   | -0.0296<br>(0.0199)    | -0.0263<br>(0.0326)       | -0.00682<br>(0.0331)     | 0.0477<br>(0.0326)       | 0.00635<br>(0.0302)      | 0.0456<br>(0.0299)     |
| SOUTH                | -0.0240<br>(0.0476)     | -0.0368<br>(0.0396)     | -0.0532<br>(0.0466)     | -0.00285<br>(0.0347)     | -0.0416<br>(0.0287)     | -0.0273<br>(0.0430)   | -0.0359<br>(0.0451)    | -0.0935***<br>(0.0230) | -0.0667***<br>(0.0238) | -0.0443**<br>(0.0202) | -0.118***<br>(0.0292)  | 0.0118<br>(0.0479)        | -0.00218<br>(0.0487)     | 0.00257<br>(0.0479)      | 0.0254<br>(0.0444)       | 0.119***<br>(0.0440)   |
| UNIV DEGREE          | 0.0632<br>(0.0627)      | 0.119**<br>(0.0521)     | 0.260***<br>(0.0614)    | 0.134***<br>(0.0457)     | 0.0558<br>(0.0378)      | 0.274***<br>(0.0567)  | 0.135**<br>(0.0594)    | 0.0554*<br>(0.0302)    | 0.00369<br>(0.0313)    | 0.0696***<br>(0.0266) | 0.178***<br>(0.0385)   | 0.0260<br>(0.0631)        | -0.0524<br>(0.0641)      | -0.168***<br>(0.0631)    | -0.0590<br>(0.0585)      | -0.157***<br>(0.0580)  |
| HS DEGREE            | -0.0243<br>(0.0373)     | 0.0155<br>(0.0310)      | 0.0722**<br>(0.0365)    | 0.0284<br>(0.0272)       | 0.00386<br>(0.0225)     | -0.00444<br>(0.0337)  | 0.00131<br>(0.0354)    | 0.00901<br>(0.0180)    | -0.0281<br>(0.0186)    | 0.0180<br>(0.0158)    | 0.0842***<br>(0.0229)  | 0.0106<br>(0.0376)        | -0.0285<br>(0.0382)      | -0.00942<br>(0.0375)     | 0.0305<br>(0.0348)       | -0.00499<br>(0.0345)   |
| NO_SCHOOL            | 0.0243<br>(0.0763)      | 0.0214<br>(0.0633)      | 0.0918<br>(0.0746)      | 0.0972*<br>(0.0555)      | 0.0450<br>(0.0460)      | -0.0392<br>(0.0689)   | -0.0374<br>(0.0722)    | -0.0181<br>(0.0368)    | -0.0330<br>(0.0380)    | -0.0187<br>(0.0323)   | 0.0583<br>(0.0468)     | -0.0643<br>(0.0767)       | 0.00311<br>(0.0779)      | 0.0144<br>(0.0767)       | -0.0442<br>(0.0711)      | -0.0279<br>(0.0705)    |
| Observations         | 1436                    | 1436                    | 1436                    | 1436                     | 1436                    | 1436                  | 1436                   | 1436                   | 1436                   | 1436                  | 1436                   | 1436                      | 1436                     | 1436                     | 1436                     | 1436                   |
| R-squared            | 0.025                   | 0.043                   | 0.094                   | 0.084                    | 0.090                   | 0.154                 | 0.112                  | 0.065                  | 0.068                  | 0.044                 | 0.116                  | 0.050                     | 0.021                    | 0.050                    | 0.057                    | 0.083                  |

Other control variables are: a dummy for the birth outside the country, dummies for investment lines, for voluntary extra contributions and for voluntary change of investment line, years of contribution in deviation from their mean, the number of early withdrawals in deviation from their mean. Standard errors in parentheses below coefficients.

\* p<0.1; \*\* p<0.5; \*\*\* p<0.01.

Table 4 – Seemingly unrelated regression with interaction variables, second questionnaire

| VARIABLES              | a2                       | a3                       | a4                      | a5                      | a6                     | a10                     |
|------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|
|                        | Evolution of Life Exp.   | L.E. and Pensions        | Numeracy                | Inflation               | Interest Compound.     | Diversification         |
| Constant               | 0.732***<br>(0.0505)     | 0.342***<br>(0.0551)     | 0.720***<br>(0.0433)    | 0.807***<br>(0.0351)    | 0.461***<br>(0.0536)   | 0.925***<br>(0.0243)    |
| TREATMENT              | -0.0618<br>(0.0499)      | 0.101*<br>(0.0545)       | 0.169***<br>(0.0428)    | 0.0901***<br>(0.0347)   | 0.167***<br>(0.0529)   | 0.0409*<br>(0.0241)     |
| TREATMENT_UNIV DEGREE  | -0.138*<br>(0.0719)      | -0.0675<br>(0.0785)      | -0.0528<br>(0.0617)     | -0.0335<br>(0.0500)     | -0.174**<br>(0.0763)   | -0.0461<br>(0.0347)     |
| TREATMENT_SOUTH        | 0.0659<br>(0.0690)       | 0.0469<br>(0.0753)       | -0.0240<br>(0.0591)     | 0.0140<br>(0.0480)      | -0.0373<br>(0.0731)    | 0.0220<br>(0.0332)      |
| TREATMENT_FEMALE       | 0.101<br>(0.0630)        | 0.0949<br>(0.0688)       | -0.00773<br>(0.0540)    | 0.00152<br>(0.0438)     | 0.0121<br>(0.0668)     | -0.0484<br>(0.0304)     |
| TREATMENT_WHITE COLLAR | 0.0874<br>(0.0641)       | 0.0317<br>(0.0700)       | -0.0302<br>(0.0550)     | -0.0339<br>(0.0446)     | -0.00567<br>(0.0680)   | 0.00572<br>(0.0309)     |
| WHITE COLLAR           | 0.0766*<br>(0.0402)      | 0.0317<br>(0.0439)       | 0.0629*<br>(0.0345)     | 0.0963***<br>(0.0280)   | 0.0913**<br>(0.0427)   | 0.0132<br>(0.0194)      |
| FEMALE                 | -0.00228<br>(0.0374)     | -0.0688*<br>(0.0409)     | -0.0271<br>(0.0321)     | -0.0601**<br>(0.0260)   | -0.0942**<br>(0.0397)  | 0.0129<br>(0.0180)      |
| AGE                    | 0.00435**<br>(0.00206)   | -0.00165<br>(0.00225)    | -0.00449**<br>(0.00177) | 0.00432***<br>(0.00143) | 0.00481**<br>(0.00218) | 0.000714<br>(0.000992)  |
| AGE_SQUARED            | -0.000329*<br>(0.000169) | -0.000335*<br>(0.000185) | -2.75e-05<br>(0.000145) | 7.03e-05<br>(0.000118)  | 2.03e-05<br>(0.000179) | -1.08e-06<br>(8.15e-05) |
| CENTRE                 | -0.0214<br>(0.0341)      | -0.0733**<br>(0.0373)    | -0.0349<br>(0.0293)     | -0.0171<br>(0.0238)     | -0.0412<br>(0.0362)    | -0.0162<br>(0.0164)     |
| SOUTH                  | -0.0494<br>(0.0428)      | -0.0635<br>(0.0467)      | -0.00395<br>(0.0367)    | -0.0437<br>(0.0298)     | -0.0456<br>(0.0454)    | -0.0483**<br>(0.0206)   |
| UNIV DEGREE            | 0.101*<br>(0.0583)       | 0.261***<br>(0.0637)     | 0.100**<br>(0.0500)     | 0.0532<br>(0.0406)      | 0.299***<br>(0.0619)   | 0.0783***<br>(0.0281)   |
| HS DEGREE              | 0.00610<br>(0.0383)      | 0.0743*<br>(0.0419)      | -0.0129<br>(0.0329)     | -0.00231<br>(0.0267)    | 0.0195<br>(0.0407)     | 0.0276<br>(0.0185)      |
| NO_SCHOOL              | 0.0138<br>(0.0776)       | 0.0952<br>(0.0847)       | 0.185***<br>(0.0666)    | 0.0205<br>(0.0540)      | 0.0849<br>(0.0823)     | -0.00241<br>(0.0374)    |
| Observations           | 1,058                    | 1,058                    | 1,058                   | 1,058                   | 1,058                  | 1,058                   |
| R-squared              | 0.042                    | 0.098                    | 0.085                   | 0.094                   | 0.138                  | 0.040                   |

Other control variables are: a dummy for the birth outside the country, dummies for investment lines, for voluntary extra contributions and for voluntary change of investment line, years of contribution in deviation from their mean, the number of early withdrawals in deviation from their mean. Standard errors in parentheses below coefficients.

\* p<0.1; \*\* p<0.5; \*\*\* p<0.01



## 4.1. Tenere conto dell'inflazione: rendimenti nominali e rendimenti reali



| Comparto                               | Monetario Plus    | Reddito                        |
|--|-------------------|--------------------------------|
| Grado di rischio                       | Basso             | Medio                          |
| In cosa investe il comparto?           | 100% obbligazioni | 85% obbligazioni<br>15% azioni |
| <b>Rendimento medio annuo NOMINALE</b> | <b>2,0%</b>       | <b>4,1%</b>                    |
| Inflazione media annua nel periodo     | 1,7%              | 1,7%                           |
| <b>Rendimento medio annuo REALE</b>    | <b>0,3%</b>       | <b>2,4%</b>                    |

**Dati basati sul periodo aprile 2005 - dicembre 2014**

