# Financial Literacy and Pension Plan Participation in Italy*

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PRELIMINARY – PLEASE DO NOT QUOTE

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By requiring individuals to decide whether to participate in (newly established) pension funds, how much to contribute and how to invest their retirement wealth, pension reforms have raised concerns about the ability of households to deal with financial decisions. Using the Bank of Italy's Survey on Household Income and Wealth, our empirical analysis shows that most individuals lack knowledge of basic concepts such as interest rates and inflation. Males, the more educated and residents in the Centre-North possess higher literacy. As for the effects, financial literacy has a positive and significant impact on the probability of pension plan participation.

**Keywords**: Financial literacy, retirement planning, pension plan participation.
**JEL classification**: D91

## 1 Introduction

Since the early '90s the Italian pension system has gone through a long reform process aimed at improving its long-term sustainability and redressing its main distortions. The reform also increased, particularly for younger generations, individual responsibility in the accumulation of retirement wealth.

Two main features characterize the reform. The first consists in the shift of the PAYG system from a Defined Benefit (DB) to a Defined Contribution (DC) formula. The latter determines benefits according to "actuarial equivalence" – i.e. to the (capitalized worth of) payroll taxes contributed during the entire working career and to the worker's retirement age – and entails, on average, much lower and more uncertain replacements ratios with respect to past and current

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benefits, determined on the basis of (an average of) the last earnings. The second feature consists in a greater role for pension funds as a way to restore an adequate level of future pensions. Participation to (privately managed) pension plans is voluntary but encouraged through fiscal incentives and suitable design of default options; workers have to decide both how much to contribute and how to allocate their pension wealth, which in turn require greater financial sophistication in both savings and investment management. Workers more heavily affected by the first pillar reform will face a higher risk that their savings will not be sufficient to finance consumption during retirement, and this risk mainly concerns low-income workers (Cappelletti and Guazzarotti 2010).

This new situation happens at a time when technological progress, financial innovations and increasing markets integration are making financial products more complex. And prompts questions about households' *preparedness*, the level of their financial knowledge, their ability to deal with financial decisions, and the impact of ignorance on savings. Several institutions (e.g. the Bank of Italy, the Authority for the Italian securities market (Consob), the Supervising Authority on Pension Funds (Covip), etc.) expressed their concerns about the ability of citizens to face the current challenges and initiatives have been promoted to address the issue of financial illiteracy, in terms of both regulation and financial education (Banca d'Italia 2009; Banca d'Italia et al. 2010).

Our paper measures the current level and the distribution of financial literacy among the Italian population, investigates its determinants and its effects on retirement planning behaviour. Specifically, we examine whether financial literacy matters in the decision to join a pension plan. The empirical analysis draws on the 2006 and 2008 waves of the Bank of Italy *Survey on Household Income and Wealth* (SHIW).

The results show that most individuals lack knowledge of basic financial concepts, and that they seem more familiar with inflation and stocks than with interest compounding. The distribution of financial literacy among the population presents features similar to other countries' records (Lusardi and Mitchell 2006, 2007; Australia and New Zealand Banking Group 2008; Bernheim 1998; van Rooij et al. 2011), with women and individuals with low education having the worst performance. A specific Italian feature is the regional divide between the North-Center and the South, which is confirmed in relation to financial literacy. As for retirement planning, financial literacy positively and significantly increases the probability of participating in a pension fund. Robustness checks confirm that financial literacy increases the probability of: i) participation even after controlling for financial literacy endogeneity; ii) a positive response to the change in the default that occurred in 2007 as for diverting the *Trattamento di Fine Rapporto* (TFR) flows to a pension fund (at least for those who explicitly chose to do so).

The rest of the paper is organized as follows. Section 2 describes the SHIW data. Section 3 reports the empirical evidence, in terms of how literate Italians are, which population sub-groups know the least and the effects of financial literacy on saving for retirement through pension plan participation. Section 4 concludes.

## 2 The data

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. In 2006 the survey covered 7,768 households (sampling units) and 19,551 individuals; in 2008 the survey covered 7,977 households and 19,907 individuals.[1] The average age of household heads is about 57; 37% are females; 64% are married; 32% completed high school and only about 9% have a university degree (or more). The average household is composed of 2.5 people. Median (net) household income is about euro 26,000 in both years and 70% of households own their house, in line with aggregate data. About 45% of the household heads were already retired at the time of interview, 35% were working as employees and 7% were self-employed.

In the 2006 wave, in addition to the standard questionnaire, about half of the sample (3,992 households whose head was born on an even year) was given an extra module on financial literacy, answered by the individual identified as the household head (i.e. "*the person primarily responsible for the household budget*"). Even though the survey has a quite long longitudinal component, financial literacy questions were included in the 2006 SHIW for the first time, which excludes any impact of the survey structure on respondents' sensitivity to the topic. In the subsequent 2008 wave, a financial literacy module was again part of the survey, including new tests along with some of the 2006 ones.

The interviews for the 2006 survey were conducted, by a specialised company, between March and October 2007; those for the 2008 wave in the period January-September 2009.[2] Data are mainly collected personally with the aid of computers, using the Computer-Assisted Personal Interviewing program (CAPI). This is adopted for the vast majority of the interviews (about 79% in

[1] Descriptive statistics about both samples are displayed in Table A1 in the appendix, showing that the sample distribution across the main socio-demographic characteristics is very similar in the two waves.

[2] Note that about 10-15% of the 2006 sample was interviewed after the outbreak of the financial crisis (August-September 2007). We chose two dates marking important events related to the crisis (August 9, 2007: main BCE and Fed operations, stock market fall; and September 14, 2007: run to Northern Rock) and checked whether individuals interviewed on or after these dates were more knowledgeable as a result of having being exposed to financial news and topics in the public debate. Since results show that those interviewed after the crisis know the same (or less) than those interviewed before, we neglect the issue of the interview date in the rest of the analysis.

both 2006 and 2008). The remaining interviews are conducted using paper-based questionnaires (PAPI, Paper-And-pencil Personal Interviewing), which the survey company subsequently transfers to a computer using the CAPI program as the input screen (Banca d'Italia 2010). Even though these methodologies should be more effective in allowing the respondents to understand and think about the financial literacy questions with respect to telephone interviews, respondents are not shown cards with the questions, so they do not read them. Individuals do not get incentives to answer.

# 3 Empirical evidence

## 3.1 How financially literate are individuals in Italy?

### *3.1.1 Measurement*

For the sake of comparison, we will exploit only three out of the six financial literacy tests included in the 2006 SHIW survey, choosing the most similar to the ones devised for the Health and Retirement Study (HRS) by Annamaria Lusardi and Olivia Mitchell (Lusardi and Mitchell, 2006). While the two questions on inflation and interest compounding use almost the same wording as the corresponding questions in the HRS, the 2006 SHIW does not contain a question on risk diversification, as stated in the HRS (i.e., based on the choice between individual stocks and a stock mutual fund). In this study, the question about risk was replaced with another one capturing stock market knowledge (question iii). The precise wording of the three tests is reported below.

i. *Interest*: Imagine leaving €1,000 in a current account that pays 2% annual interest and has no charges. What sum do you think will be available at the end of 2 years? Less than 1,020 euros | Exactly 1,020 euros | More than 1,020 euros | Don't know
ii. *Inflation*: Imagine leaving 1,000 euros in a current account that pays 1% interest and has no charges. Imagine also that inflation is running at 2%. Do you think that if you withdraw the money in a year's time you will be able to buy the same amount of goods as if you spent the 1,000 euros today? Yes | No, I will be able to buy less | No, I will be able to buy more | Don't know
iii. *Stocks*: Imagine you have only equity funds and stock market prices fall. Are you...? (Read aloud) Better off | Worse off | As well off as before | Don't know

The 2008 does not contain exactly the same set of questions as in 2006, but allows to recover a test on risk diversification that is very similar to the HRS one (question ii), that was missing in the previous survey. The three tests are again reported below.

i. *Inflation*: same as in the 2006 survey

ii. *Risk HRS*: Which of the following investment strategies do you think entails the greatest risk of losing your capital? Investing in the shares of a single company | Investing in the shares of more than one company | Don't know

iii. *Risk 2*: A company can be financed by issuing either shares (equity securities) or bonds (debt securities). Which do you think is most risky for the investor? Shares | Bonds | They are equally risky | I don't know the difference between shares and bonds | Don't know

Note that "*Don't know*" (DK) is always a response option. This means the respondents are not forced to give a (random) answer and should therefore minimize guessing. Among the coded answers there is no explicit category for "refusals". Since only two observations in the 2006 wave (out of 3,992) report missing answers for the financial literacy task, these can be interpreted as refusals and we thus drop the corresponding households from the analysis. There are no missing values/refusals to the financial literacy tests in the 2008 survey.

### *3.1.2 Descriptive statistics*

Table 1 present the 'raw' answers to the tests. Panel A of Table 1 reports the answers to the interest compounding question, showing that 40% gives a correct answer, while about 28% does not know. Among those giving a wrong answer (32%), 25% answers "exactly €102" which represents a relatively less serious mistake than "less than €102" (7%). The answers to the inflation tests are shown in Panel B, where almost 60% gives the correct answer, 30% does not know and few provide an incorrect answer (10%). Finally, in the question about stocks slightly more than half sample (52%) gives the correct answer (Panel C). Overall, about one fourth of the 2006 sample gives three correct answers, one fourth gives no correct answer, and almost one fifth does not know the answer to all the tests (Panel D). Comparing the answers on the three tests, Italians seem more familiar with inflation and stocks than with interest compounding. This may be related, among other factors, to the personal memory of an inflationary environment, as a large share of the sample experienced relatively high inflation during their prime age (in the '70s and '80s). On the contrary, knowledge of the stock market is more unexpected, given that households' propensity to hold risky financial assets is quite low: as of 2008 only 9.2% of households held government securities, 6.1% held shares (directly), and 19.2% held risky assets, including private bonds, stocks, funds, etc. (Banca d'Italia 2010).

[Table 1 here]

The only test question that is included in both the 2006 and 2008 waves is the one about inflation. By comparing Panel B in Table 1 and Panel A in Table 2, it is possible to see that the

share of correct answers increased and the DK decreased over time, although remaining still quite high. This improvement does not seem to be not related to a "measurement effect" (i.e. respondents learned because they were tested twice on the same question) but could be attributed to media exposure during the financial crisis. By comparing – among the 2008 respondents who were interviewed also in 2006 – the two sub-samples of those who were (randomly) chosen for the financial literacy tests in 2006 and those who were not (and thus received the FL module in 2008 for the first time), we check that the answers to the inflation test are not statistically different between the two groups (not reported).

As for the remaining questions in the 2008 survey, about 45% of the whole sample can correctly indicate that holding shares of a single company exposes to a higher risk of losses than holding shares of several companies (Panel B). Moreover, 34% correctly indicates that shares are riskier as an investment than (private) bonds (7%), while almost 13% declares that they do not know the difference and an additional 18% does not know the answer at all (Panel C). About 26% indicates that bonds and stocks are equally risky, possibly because they are aware that corporate bonds are usually riskier than government bonds. Observing Tables 1 and 2, it is noticeable that the share of DK is very high (around 30% of the 2006 sample on average; between 19% and 28% in the 2008 one), which mirrors the extremely low refusal rate.

[Table 2 here]

Again, these results are consistent with a low stock market participation rate and scarce familiarity with risky assets. Moreover, the topics covered by these five questions are not taught in standard school programs in lower secondary schools and only in some types of high schools, so respondents can hardly rely upon previous knowledge acquired in school.

### 3.2 Who knows the least?

Tables 3 and 4 show financial literacy performance by socio-demographic characteristics in the 2006 and 2008 samples respectively. The financial literacy age profile is hump-shaped, with a peak in performance in the age class 36-50 (note, however, that in the 2008 sample the performance of the age groups 36-50 and 51-65 is hardly significantly different). As expected, the age classes with the highest share of correct answers also report the lowest proportion of DK. This pattern is the same across all questions. Men are more knowledgeable than women in all questions and in both waves, and the difference is always statistically significant at 1% level. As in other countries, women have also a very high proportion of DK. On the one hand, the fact that all respondents are household heads should reduce gender differences, because this sample is relatively more homogeneous than a sample of the general population. On the other hand, the gender gap can have

to do with age and marital status, as a large share of female respondents are elderly widows (38% in both waves, while widowers are only about 5% among male respondents). Financial literacy is strongly monotonically increasing with the level of education. This is true when looking at both correct and DK answers. For instance, in the 2008 SHIW only 12% of those with at most primary education (representing 26% of households heads) could answer all three questions correctly, compared to 47% among those with a university degree.

The self-employed (including small business owners, owners or members of a family business, and members of 'liberal professions' such as lawyers, architects, and so forth) display better knowledge than employees, as they are wealthier and more used to managing their personal/business finances (however, in the 2006 sample the difference in financial literacy between employees and self-employed is almost never statistically significant, while it is always significant in the 2008 sample, probably due to the higher sample size). The fact that employees perform better than the retired might hide age effects and declining cognitive abilities. The non-employed (including the unemployed, homemakers, students and so on) have the lowest performance in all measures.

[Tables 3 and 4 about here]

Housing tenure is also related to financial literacy (not reported). Homeownership rate in Italy is very high (around 71% according to the 2001 census, Istat 2004, and 70% in the SHIW sample used for this analysis), and housing equity constitutes – not considering social security wealth – the largest fraction of households' wealth. Homeowners display higher financial literacy than renters, consistently with the fact that financial knowledge is usually associated with higher household wealth (van Rooji et al. 2008). Moreover, among homeowners, households currently paying a mortgage demonstrate higher knowledge than those who do not, which suggests that contracting housing debts constitutes a learning opportunity.[3]

### *3.2.1 Regional disparities*

A peculiarity of Italy is the stark disparity between northern and southern regions as captured by important economic and social indicators, such as employment rates, per capita income and average education. Financial literacy is no exception.

Figures 1 and 2 depict the financial literacy distribution across Italian regions according to the 2006 and 2008 tests respectively. Figures in the left panel report the 'raw' distribution of

[3] The category of households not paying a mortgage at the time of interview includes both those who already repaid in the past and those who never took out a mortgage. This may bias the results, reducing the difference in financial literacy between owners with and without a mortgage; thus the effect of mortgages is likely to be even larger.

financial literacy (number of correct answers and proportion of three correct answers) as measured by the SHIW. The four categories represent quartiles of each variable. As expected, the usual North-South disparity emerges: broadly speaking, households living in southern regions (and isles, i.e. Sicily and Sardinia) tend to perform worse in all questions than those living in the Centre and in the North-east. However, there is some variation across regions beyond the simple north-south divide: for instance, in 2008 north-western regions fall in the lowest literacy quartile for both measures.

Figures on the right panel, instead, show the level of financial literacy that is predicted by an econometric model with demographics and regional dummies as explanatory variables.[4] As before, the four categories represent quartiles of the corresponding variable. These figures suggest that the regional gap is not simply explained by a different population composition; even after controlling for socio-demographic characteristics (including household income), southern regions have lower financial literacy.

[Figures 1 and 2 here]

### 3.3 Does financial literacy matter?

Recent literature has shown that financial literacy is associated with a wide range of financial decisions, such as stock market participation, portfolio diversification, and the tendency to avoid over-indebtedness (Guiso and Jappelli 2008; Kimball and Shumway 2007; Lusardi and Tufano 2008; van Rooij et al. 2011). Moreover, Lusardi and Mitchell (2007) have shown that financial literacy is positively related to planning for retirement and that planners have significantly higher wealth at retirement than non-planners (where planning affects accumulation, and not vice versa). This evidence is corroborated by other studies pointing out the role of the propensity to plan for wealth accumulation (Ameriks at al. 2003), and documenting a positive and significant effect of financial literacy on the net worth of Dutch households (van Rooij et al. 2008).

An aspect of planning and saving for retirement that deserves attention is pension plan participation. For instance, Agnew et al. (2007) study pension plan participation in the US, finding that in voluntary enrolment 401(k) plans, the effect of financial literacy on saving is substantial, and that under automatic enrolment, low levels of literacy are strongly linked to employees' decision to quit their employer's savings plan.

[4] When the dependent variable is the number of correct answers a linear model is estimated by OLS, while when the dependent variable is a dummy for giving three correct answers a probit model is used. Covariates include age and age squared, gender, years of education, marital status, number of children in the household, household total net income, a dummy for self-employment, a dummy for home-ownership, and regional dummies. The inclusion of interactions terms between regional dummies and age, years of education and income does not change the results. The cut-off points for the four categories displayed in the maps are based on the quartiles of each variable.

In this section we investigate the role of financial literacy on pension plan participation in Italy, an issue which the large cuts in public pension benefits due to pension reforms has brought to the forefront.

Despite a rather generous tax treatment, participation in pension funds is still quite low (Covip 2008). This has certainly to do with high mandatory payroll tax rates (33% for employees; 20% for self-employed), generous pension benefits and a general mistrust towards financial markets (Castellino and Fornero 2001, 2008).

To counteract a rather disappointing performance, in 2007 a new reform of the system of severance payments (*Trattamento di Fine Rapporto*, TFR) was introduced, aimed at encouraging a higher take-up. The TFR consists in a fraction of the worker's wage (approximately equal to one month's pay) that is retained as a book reserve by the employer, and paid back to the worker upon leaving the firm, whether voluntarily or not. The annual flows are compounded by using a return rate established by the law and partially indexed to inflation.[5] The reform allowed employees to choose, in the period January-June 2007 whether to maintain their future flows of TFR within the firm or divert them to a pension fund, to be invested in the financial market.[6]

Moreover, the reform introduced a default option. For new entrants the choice has to be made within six months from hiring, and in case no choice is expressed within this time period, participation in the pension fund is considered the default option and the TFR flows are automatically transferred to an occupational fund (chosen according to specific and rather complex rules).

Participation rates increased after the reform, but not as much as expected. Apart from a possibly inadequate communication campaign, the irreversibility of the choice was one of the elements that most likely reduced the effectiveness of the reform: a worker keeping her TFR within the firm can at any time opt for a pension fund, but when she does so she cannot reverse her choice.[7] Pension plan participants were about 3.2 millions (of which 2.1 private sector employees) in 2006 and grew to 4.8 in 2008 (3.6 private sector employees). This implies that the participation

[5] The TFR is capitalized annually at 1.5% plus 3/4 of the inflation rate measured by the Italian Statistics Institute (Istat).

[6] The reform treated differently workers in firms with more or less than 50 employees. While small-firm employees faced the choice between leaving their future TFR flows with the firm or transferring them to a pension fund, employees in larger firms could opt for a pension fund or for having their TFR administered by the National Institute for Social Security (INPS), instead of their firm, at the same conditions as if it remained at the firm's disposal. This difference in treatment induced different participation rates in the two groups, with small firms' employees being more likely to leave their TFR in the firm and large firms' employees being more willing to transfer them to a pension scheme. Several reasons may account for this different behaviour, including mistrust towards financial institutions and INPS (Boeri and Zingales 2008) and fears of negatively affecting one's firm source of financing (and therefore one's own future employment prospects) (Corsini et al. 2010).

[7] See Rinaldi (2011) for a review of the factors that contributed to explain the limited success of the reform.

rate over the total employed population went approximately from 14% in 2006 to 21% in 2008.[8] An increasing participation rate emerges also from the SHIW data, where participation rates among all workers are about 11% and 13.5%, in the 2006 and 2008 samples respectively.[9] Given the relevance of private pensions take-up in Italy, the rest of the paper is devoted to examine the relation between financial literacy and pension plan participation, as an important example of the effects of literacy on retirement planning.[10]

### *3.3.1 Pension plan participation*

To investigates the effect of financial literacy on pension plan participation we use both pre-reform and post-reform data from the 2006 and 2008 SHIW. The analysis is restricted to the sample of employees and self-employed aged 25-65, excluding the unemployed and other respondents out of the labor force (retirees, students, homemakers, etc.). Simple univariate statistics reported in Tables 5 and 6 show that financial literacy is higher for respondents with a supplementary pension than for those without, and the difference between the two groups is highly statistically significant for most measures and in both samples.

[Tables 5 and 6 here]

A multivariate analysis of the impact of financial literacy on pension plan participation is conducted estimating a linear probability model by ordinary least squares (OLS) of the following specification

$$P = X_1 \beta_1 + FL\gamma + u_1 \quad (1)$$

where $P$ takes the value of one if the respondent (household head) participates in a private pension scheme at the time of interview. Financial literacy $FL$ is measured in two ways: first, we use a dummy that takes the value of one when the respondent is able to answer all three questions correctly; second, we use a variable counting the number of correct answers to the three questions (taking values from 0 to 3). $X_1$ is a vector of covariates, including a second-order polynomial in age, a gender dummy for females, four dummies indicating the highest level of education attained by the respondent, marital status dummies, the number of children living in the household, household income quartiles dummies, a dummy taking the value of one for home-owners (as a proxy for household wealth), a dummy for being self-employed, and regional dummies.

[8] Own computations based on administrative data from the Authority for Pension Funds Supervision (Commissione di Vigilanza sui Fondi Pensione, Covip). See for reference Covip (2008, 2009, 2010) and Istat (2010).
[9] The underestimation of participation rates in the SHIW with respect to aggregate data may be due to several reasons, including respondents' tendency to under-report or not report information about their wealth, and low sampling of workers in sectors with above average participation rates, such as large firms (Cappelletti and Guazzarotti 2010).
[10] Unfortunately, explicit information on planning behavior is not available in the SHIW, except as far as pension plan participation is concerned.

Table 7 reports the OLS estimation results for 2006. The first and third columns show that giving an additional correct answer raises the participation probability by 2 percentage points, while being able to answer all three questions correctly increases the chances of participation by 3 percentage points (but its effect is significant only at 10% level). Moreover, participation is associated with being male and the age profile is slightly concave. Higher income is positively associated with the probability of having a pension plan, while home-ownership and self-employment have no effect.

[Table 7 here]

In a separate regression (not reported) we use different measures of financial literacy, including dummies for answering correctly one question (each test included separately), dummies for answering correctly two questions (each couple separately), the number of DK and a dummy for answering at least one DK. All these measures have a significant effect, except the dummy on inflation. The dummy for answering correctly the interest question seems to be the most effective (it increases the probability of participation by 4.9 percentage points).

Some other factors might affect the propensity to join a pension plan, such as risk preferences, and expectations about longevity, retirement age and public pension system replacement rate (Guiso et al. 2009). In a separate regression (not reported) we add a dummy for being very risk tolerant, the expected replacement rate and the expected retirement age elicited by the SHIW. Moreover, since the SHIW does not report subjective estimates of life expectancy, we add two dummy variables indicating whether the respondent's parents are alive, and their interactions with parents' age, as proxies for longevity. According to the life cycle model, individuals expecting to live longer should be more likely to retire later, or to save more for retirement, or a combination of the two. Risk tolerant individuals show a higher probability of having a pension plan, while those expecting to retire later are less likely to do so. The expected replacement rate and proxies for longevity have no effect. After controlling for these additional variables, the effect of financial literacy measured by the number of correct answer is substantially unchanged, while the dummy for three correct answers becomes not significant.

As a second step, we allow for the possibility that financial literacy is endogenously determined. Jappelli and Padula (2011) illustrate theoretically the endogeneity of financial literacy with respect to saving decisions, showing how literacy and wealth are accumulated jointly. In our case, financial literacy endogeneity may derive from experience (i.e. experience of opening and managing one's plan), from individuals' effort to learn to better manage their investments, or from an unobserved factor simultaneously driving both the decision to join a pension plan and that of acquiring better financial knowledge (e.g. an unobserved taste for financial issues). Moreover,

financial literacy is difficult to measure and it is likely to be measured with error, possibly leading to a downward bias in the OLS estimate of the financial literacy.

Building on (1) we estimate the following linear probability model using the generalized method of moments (GMM), controlling for the (possible) endogeneity of financial literacy:

$$P = X_1 \beta_1 + FL\gamma + u_1 \qquad (2)$$
$$FL = X_1 \beta_1 + X_2 \beta_2 + v_2$$

where $X_1$ is a vector of controls as before and $X_2$ is a vector of financial literacy instruments.

Despite the great difficulty in finding valid instruments for financial literacy, we propose two variables related to the cost of learning and acquiring financial knowledge and information.[11] The instruments for financial literacy include a dummy taking the value of one if (at least) one household member has a degree in economics,[12] and a dummy taking the value of one if (at least) one household member uses a computer (either at home, at work or elsewhere). The validity of these instruments rests on the hypothesis that the presence of an economist and/or a computer user in the household makes it easier for the respondent to acquire knowledge and information about financial investments, while not being determined by respondents' decision to join a pension fund. This is supported by the results of the Hansen's test, that do not reject the null of instruments validity (p-value 0.384 and 0.165 for the two financial literacy measures). Moreover, the F test is relatively high (> 10), suggesting that instruments are not weak. First stage estimates are reported in column I of Table A2 in the appendix. Table 7 (second and fourth columns) reports the GMM estimation results for 2006. Giving an additional correct answer raises the participation probability by 13 percentage points.

In spite of the tests, it may be hard to argue that these instruments are completely exogenous. For instance, the presence of an economics graduate may correlate with an unobserved taste for economics/finance within the household, or it may affect pension plan participation directly, and not though financial literacy. To support the robustness of our IV results, we report in Table A2 (columns II to IV) in the appendix the estimates obtained using other sets of instruments. These alternative instruments may provide a more exogenous variation in literacy, but tend to be

[11] Given the difficulty in finding valid instruments for financial literacy, several potential instruments were turned down because they either were not correlated with financial literacy, or they violated the hypothesis of instruments validity (Hansen's test). These include education related variables at the regional level (e.g. college graduates), readership of financial newspapers at regional level, various measures of adult literacy at regional level in 2005 from the "Adult literacy and life skills" survey conducted by the OECD, and numeracy level in the 50+ population at regional level from the SHARE survey.

[12] Results are unchanged if we substitute the economics graduate dummy with a dummy for having a graduate in economics, politics or law (degrees in politics and law in Italy include at least one course in economics).

weaker. Nevertheless the IV financial literacy coefficients are quite robust. These instruments include a dummy taking value one if the father of the respondent attained at least upper secondary education (high school), a dummy indicating whether the family is re-paying a mortgage to buy or restructure its house of residence (at the time of interview), and the share of employees working in small firms (up to 50 employees) at regional level (Istat 2002). Parents' education can be transmitted to children's education and affect their financial literacy (Lusardi, Mitchell and Curto 2010). As for the mortgage dummy, in section 3.2 we noted that mortgagers have higher financial literacy, probably because taking out a mortgage offers an opportunity for learning about interest rates and inflation. Moreover, mortgages are typically taken out before pension plans. Finally, the share of employees working in small firms within each region captures regional differences in entrepreneurship, and Tables 3 and 4 suggest that the self-employed have higher financial literacy (analogous results are obtained with the share of employees in small-medium firms). Overall, the results obtained by using (various combinations of) these instruments suggest that financial literacy increases the probability of pension plan participation also when controlling for its potential endogeneity.

As a robustness check to the previous analysis, the relations in (1) and (2) are estimated again using the 2008 SHIW data. The overall results displayed in Table 8 broadly confirm 2006 results, also in terms of magnitude, despite the fact that the financial literacy measures are partially different in the two waves. We check the robustness of OLS estimates using different measures of financial literacy (i.e., dummies for giving one/two correct answers, the number of DKs and a dummy for at least one 'do not know') and all of them are significant, with very little difference in magnitude across questions. When the additional regressors are used (including, as before, risk aversion, expected retirement age, expected replacement rate and longevity), the effect of financial literacy decreases by about one percentage point with respect to the baseline of Table 8 but it remains highly significant. Finally, we perform IV regressions with the same instruments used for the 2006 sample. Despite the potential shortcomings of the instrumental variables and the different tests measuring financial literacy, results for 2008 are remarkably similar to the 2006 ones. Again, first stage regressions for various instruments are relegated to the appendix in Table A3.

[Table 8 here]

### *3.3.3 The choice about the TFR destination*

As was previously mentioned, a closely related topic to pension plan participation is employees' decision about the destination of their TFR after January 2007. The recent 2008 wave of

the SHIW allows to investigate this issue, as the choice about the TFR destination is captured by the following question:

> "(If the household member is an employee and present at time of interview) Has (household member's name)'s severance pay fund been transferred to some form of supplementary pension scheme (pension fund or private retirement plan)? Yes | No | Do not know".

where about 82% of employees in the sample left the TFR at pre-reform conditions,[13] 10% transferred it to a pension fund and 8% report that they don't know. While it is possible that respondents misreport their TFR decision (Gustman et al., 2008), this allocation is consistent with the one emerging from an *ad hoc* survey conducted soon after the reform on a sample of private sector employees (Boeri and Zingales 2008), where the share of workers explicitly choosing to maintain their TFR at the same conditions as before the reform is about 65%.

It is not entirely clear how to interpret the behavior of the 8% who answered "do not know" to the above question. Given the default option embedded in the reform (i.e., the TFR of workers not making any explicit choice is to be transferred to an occupational fund) it is legitimate to assume that their TFR was transferred to a pension plan. Alternatively, they may have answered this way because they truly did not remember. We will allow for both interpretations in the empirical analysis that follows.

As in the previous section, the expected result is that more literate individuals should be more willing to transfer their TFR flows to a pension fund, not only to benefit from higher expected returns (at least before the reform, which took place before the crisis), but also to take advantage of generous fiscal incentives.

Bivariate statistics in Table 9 confirm this hypothesis. The analysis is restricted to the sample of (household head) employees aged 25-65.[14] The table reports the average number of correct and do not know answers in the three groups of workers who moved their TFR to a pension fund (PF), who explicitly decided to maintain it in its previous form (FIRM), and who do not know

[13] Note that – as was mentioned before in section 3.3 – workers in firms with more than 50 employees cannot actually maintain their TFR within the firm, but can only choose between transferring it to a pension fund or having it administered by the National Institute for Social Security (INPS), at the same conditions as if it remained at the firm's disposal. For ease of exposition, in the following analysis we will refer to the latter option as "firm" regardless of firm size.

[14] Even though the 2007 reform is directed at private sector employees, also public sector employees are included in the analysis, since some of them report that they transferred their TFR to pension fund. This may not necessarily be a mistake in answering. For instance, it is not easy to disentangle employees in the public or private health and education sectors. Moreover, (public) school teachers hired after 2000 have the possibility to transfer their TFR to an occupation fund, like all private employees.

(DK). Respondents who transferred their TFR to a pension fund have higher literacy than the other two groups, and the FIRM group has higher literacy that the DKs. When testing the differences in mean literacy between these groups we obtain that the difference between the PF and FIRM groups is always statistically significant at 1%, and the difference between FIRM and DK is significant at 1% in most cases. Moreover, also the difference in mean literacy between the 'active decision-makers' (PF and FIRM) versus the DKs is significant, while the difference between FIRM and the rest (i.e. those who joined a pension fund actively or passively) is not. This indicates that financial ignorance is to some extent correlated with inertial behaviour (since the DKs have the lowest knowledge). However, it is not easy to reconcile the link between inertia and lack of literacy with the fact that more than 80% of the workers actively decided not to join pension funds. This needs to be investigated more thoroughly.

[Table 9 here]

We analyze workers' choice in a multivariate analysis, where the following linear probability model is estimated by OLS:

$$TFR = X_1 \beta_1 + FL\gamma + u_1 \qquad (3)$$

and where *TFR* equals one when the TFR is transferred to a pension fund. As before, financial literacy *FL* is measured by the number of correct answers and by a dummy indicating whether the respondent is able to answer all three questions correctly. $X_1$ is a vector of covariates, including a second-order polynomial in age, a gender dummy for females, four dummies indicating the highest level of education attained by the respondent, marital status dummies, the number of children living in the household, household income quartiles dummies, a dummy taking the value of one for home-owners (as a proxy for household wealth), a dummy for being self-employed, and regional dummies.

The results are displayed in Table 10 and confirm the descriptive findings of Table 9. First, financial literacy increases the probability of putting the TFR in a pension scheme when DK respondents are excluded from the regression (i.e. comparing PF to FIRM). Second, financial literacy is non-significant when DK respondents are considered to have (unconsciously) joined a pension plan (i.e. comparing the active and passive PF to FIRM). This is because the group of DK respondents has much lower literacy than the rest of the sample (see Table 9). Third, financial literacy (number of correct answers) increases the probability of expressing an active decision (either for PF or FIRM) with respect to not making any explicit choice (DK). These findings indicate that financial literacy is a driver of the decision to voluntarily transfer one's own TFR to a

pension fund but it is (obviously) ineffective on those who cannot tell their TFR destination. This is exactly the spirit behind the default option embedded in the reform, that is of encouraging pension plan participation among the undecided. At the same time, financial literacy is more strongly associated with an active decision-making in favour of pension funds rather than in favour of the firm.

[Table 10 here]

We perform a further robustness check, including additional controls in the regression. The explanatory power of financial literacy is hardly affected when risk aversion and expectations about public pensions (replacement rate and retirement age) are controlled for. However, as was mentioned previously, the decision about TFR destination may be related not only to determinants of pension plan participation (such as risk preferences and expectations about public pensions), but also to the size of the firm. This is because of the 'discontinuity' induced by the reform itself, treating differently workers in firms with more or less than 50 employees. When we add firm size dummies as regressors we obtain that workers in larger firms (more than 100 employees) are more likely to join pension funds, consistently with the evidence of Boeri and Zingales (2008) and Corsini et al. (2010). At the same time, when firm size dummies are included the effect of financial literacy on the probability of transferring one's own TFR to a pension fund (excluding the DKs) is reduced and becomes non-significant when measured by the three-correct dummy. Overall, this evidence suggests that the decision about TFR destination is a complex one and that the effect of financial literacy, while non-negligible, is not fully robust.

## 4 Discussion and Conclusions

The Italian pension reforms will enhance individual responsibility in the accumulation of retirement wealth and confer a greater role to private pensions in ensuring old age income. Both the number and the complexity of personal choices will increase, particularly for younger workers, at a time when financial innovation and increasing markets integration are making the task of saving for retirement more difficult.

This evolving context demands more financial sophistication on the part of Italian citizens to manage their savings, and prompts concerns about the level of their knowledge and ability to deal with complex financial decisions. This paper exploits new questions about financial literacy recently introduced in the Survey on Household Income and Wealth to investigate financial literacy distribution in the Italian population and its impact on retirement planning. In particular, we concentrated on pension plan participation, also by considering workers' response to the 2007 severance pay (TFR) reform.

The empirical results show that most individuals lack knowledge of basic financial concepts, even if they seem more familiar with inflation and stocks than with interest compounding. Similarly to other countries' findings, women and less educated individuals display the worst performance. A stark regional divide between the Center-North and the South is also shown by the data.

As for the effects, financial literacy has a positive and significant impact on the propensity to save for retirement through a private pension plan. Robustness checks corroborate this result. First, financial literacy increases the probability of participating to a pension fund even after controlling for financial literacy endogeneity. Second, when looking at employees' response to the 2007 reform, financial literacy increases workers' probability of transferring their TFR flows to a pension fund (at least for those who do so willingly).

These findings confirm and reinforce previous results about the positive impact of financial literacy on financial behaviour (on planning, saving, wealth diversification etc.), and provide a further rationale for public intervention to improve the level of financial literacy in the Italian population. At the same time, results indicate that some population sub-groups face higher risks of not possessing sufficient financial knowledge and skills to adequately face the challenges posed by the reformed pension system. While an improved level of financial knowledge would be beneficial in general, public policies on financial education should primarily be directed at these groups.

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Figure 1: Financial literacy at regional level (2006)

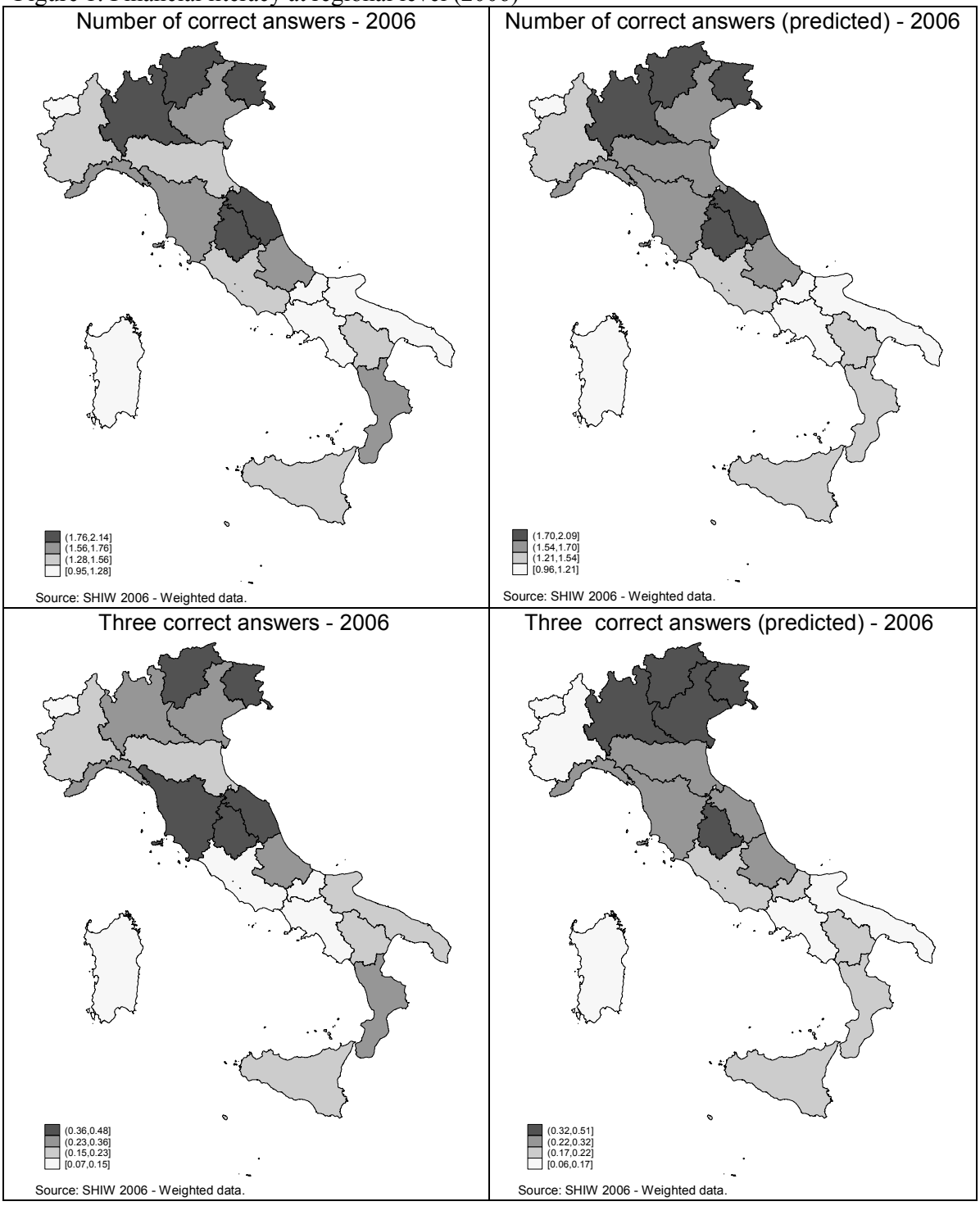

Figure 2: Financial literacy at regional level (2008)

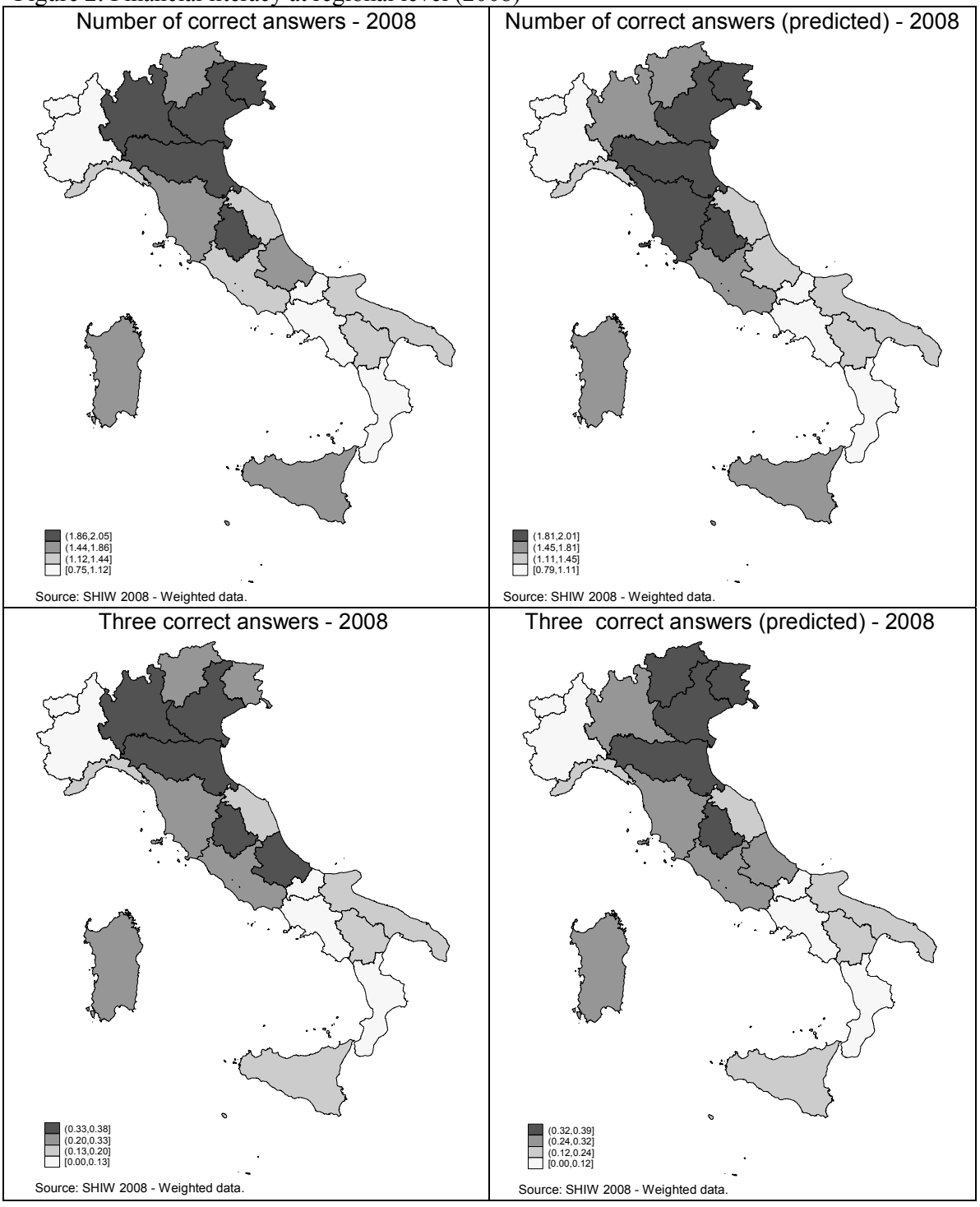

Table 1: Answers to the 2006 financial literacy questions (percentage)

| | All household heads | Household heads 25-65 |
|---|---|---|
| *Panel A -- Interest* | | |
| Less than 1,020 euros | 6.76 | 7.39 |
| Exactly 1,020 euros | 25.03 | 28.12 |
| More than 1,020 euros (correct) | 40.02 | 44.57 |
| Don't know | 28.19 | 19.92 |
| *Panel B -- Inflation* | | |
| Exactly same amount | 3.83 | 4.33 |
| Less (correct) | 59.3 | 65.44 |
| More | 6.18 | 6.7 |
| Don't know | 30.7 | 23.53 |
| *Panel C -- Stocks* | | |
| Better off | 1.65 | 1.86 |
| Worse off (correct) | 52.17 | 59.23 |
| As before | 12.52 | 12.7 |
| Don't know | 33.66 | 26.21 |
| *Panel D -- Overall performance* | | |
| Correct answers to interest and inflation | 31.51 | 35.69 |
| All answers correct | 24.88 | 28.33 |
| No correct answer | 26.43 | 19.76 |
| At least one "do not know" | 44.88 | 36.95 |
| All "do not know" | 19.93 | 12.91 |
| N obs | 3992 | 2594 |

Source: SHIW 2006 – Weighted data. The text of questions is the following:

- Interest: Imagine leaving €1,000 in a current account that pays 2% annual interest and has no charges. What sum do you think will be available at the end of 2 years?
- Inflation: Imagine leaving 1,000 euros in a current account that pays 1% interest and has no charges. Imagine also that inflation is running at 2%. Do you think that if you withdraw the money in a year's time you will be able to buy the same amount of goods as if you spent the 1,000 euros today?
- Stocks: Imagine you have only equity funds and stock market prices fall. Are you...?

Table 2: Answers to the 2008 financial literacy questions (percentage)

| | All household heads | Household heads 25-65 |
|---|---|---|
| *Panel A -- Inflation* | | |
| Exactly same amount | 4.2 | 5.05 |
| Less (correct) | 72.99 | 77.83 |
| More | 2.75 | 2.7 |
| Don't know | 20.05 | 14.42 |
| *Panel B -- Risk HRS* | | |
| One company shares (correct) | 45.13 | 50.13 |
| Shares of several companies | 26.43 | 28.5 |
| Do not know | 28.45 | 21.37 |
| *Panel C -- Risk 2* | | |
| Shares (correct) | 34.04 | 38.77 |
| Bonds | 7.45 | 8.03 |
| Equally risky | 26.88 | 28.45 |
| I don't know the difference | 12.85 | 11.23 |
| Don't know | 18.78 | 13.52 |
| *Panel D -- Overall performance* | | |
| All answers correct | 24.33 | 28.3 |
| No correct answer | 21.09 | 16.08 |
| At least one “do not know” | 42.27 | 34.62 |
| All “do not know” | 13.05 | 8.16 |
| N obs | 7977 | 5063 |

Source: SHIW 2008 – Weighted data. The text of questions is the following:

- Inflation: Imagine leaving 1,000 euros in a current account that pays 1% interest and has no charges. Imagine that inflation is running at 2%. Do you think that if you withdraw the money in a year's time you will be able to buy the same amount of goods as if you spent the 1,000 euros today
- Risk HRS: Which of the following investment strategies do you think entails the greatest risk of losing your capital?
- Risk 2: A company can be financed by issuing either shares (equity securities) or bonds (debt securities). Which do you think is most risky for the investor?

Table 3: Performance by socio-demographic characteristics (2006)

| | Interest | | Inflation | | Stocks | | Overall | |
|---|---|---|---|---|---|---|---|---|
| | Correct | DK | Correct | DK | Correct | DK | Three Correct | At least 1 DK |
| *Age* | | | | | | | | |
| Age <=35 | 39.25 | 27.24 | 57.85 | 28.79 | 49.69 | 32.07 | 22.9 | 42.35 |
| Age 36-50 | 45.64 | 16.24 | 68.58 | 19.88 | 62.09 | 23.1 | 30.29 | 32.59 |
| Age 51-65 | 44.75 | 22.59 | 64.04 | 26.66 | 58.88 | 28.36 | 27.51 | 41.24 |
| Age 65+ | 30.32 | 46.13 | 45.73 | 46.47 | 36.66 | 50.04 | 17.44 | 62.15 |
| *Gender* | | | | | | | | |
| Men | 45.47 | 21.28 | 65.77 | 24.18 | 58.08 | 28.23 | 29.51 | 37.85 |
| Women | 30.78 | 39.9 | 48.34 | 41.74 | 42.14 | 42.87 | 17.04 | 56.78 |
| *Education* | | | | | | | | |
| No education | 13.67 | 72.21 | 23.22 | 72.72 | 18.36 | 75.21 | 7.17 | 87.07 |
| Primary (Isced 1) | 27.87 | 47.8 | 44.75 | 47.51 | 33.96 | 52.62 | 12.96 | 67.37 |
| Lower sec (Isced 2) | 38.49 | 24.69 | 59.32 | 29.82 | 53.71 | 32.52 | 22.24 | 44.97 |
| Upper sec (Isced 3) | 50.91 | 14.69 | 71.11 | 17.48 | 64.02 | 18.8 | 35.03 | 27.79 |
| Degree + (Isced 5+) | 54.3 | 8.72 | 77.7 | 10.38 | 73.42 | 14.78 | 39.12 | 20.55 |
| *Occupational status* | | | | | | | | |
| Self-employed | 49.98 | 9.4 | 71.2 | 15.07 | 67.19 | 15.74 | 28.92 | 24.72 |
| Employees | 45.33 | 17.27 | 66.79 | 22.07 | 60.11 | 24.6 | 28.74 | 35.11 |
| Non-employed | 31.76 | 38.07 | 49.66 | 40.08 | 47.14 | 40.04 | 20.3 | 55.77 |
| Retired | 34.52 | 41.68 | 50.59 | 41.3 | 41.39 | 46.01 | 20.65 | 57.41 |

Source: SHIW 2006 – Weighted data. Sample: all household heads (N = 3992)

Table 4: Performance by socio-demographic characteristics (2008)

| | Inflation | | Risk (HRS) | | Risk 2 | | Overall | |
|---|---|---|---|---|---|---|---|---|
| | Correct | DK | Correct | DK | Correct | DK | Three Correct | At least 1 DK |
| *Age* | | | | | | | | |
| Age <=35 | 73.91 | 16.02 | 47.72 | 21.16 | 32.41 | 29.89 | 24.38 | 39.86 |
| Age 36-50 | 78.36 | 14.28 | 50.91 | 20.61 | 40.75 | 23.71 | 29.55 | 33.05 |
| Age 51-65 | 78.88 | 13.85 | 49.81 | 22.58 | 38.46 | 24.03 | 28.01 | 34.66 |
| Age 65+ | 62.32 | 32.5 | 34.44 | 43.87 | 24.16 | 46.6 | 15.95 | 58.82 |
| *Gender* | | | | | | | | |
| Men | 77.51 | 15.86 | 50.18 | 23.86 | 38.87 | 25.62 | 28.22 | 36.07 |
| Women | 65.36 | 27.13 | 36.59 | 36.2 | 25.88 | 41.79 | 17.76 | 52.76 |
| *Education* | | | | | | | | |
| No education | 37.32 | 57.09 | 15.52 | 72.15 | 5.743 | 80.23 | 3.607 | 87.65 |
| Primary (Isced 1) | 59.09 | 35.17 | 31.28 | 45.84 | 19.86 | 51.78 | 11.96 | 64.75 |
| Lower sec (Isced 2) | 74.77 | 17.4 | 42.38 | 27.77 | 32.67 | 31.37 | 22.24 | 43.05 |
| Upper sec (Isced 3) | 82.51 | 10.04 | 54.94 | 16.25 | 42.13 | 16.34 | 31.13 | 26.54 |
| Degree + (Isced 5+) | 86.41 | 7.307 | 67.69 | 8.524 | 58.51 | 11.94 | 47.15 | 17.18 |
| *Occupational status* | | | | | | | | |
| Self-employed | 83.83 | 7.955 | 60.23 | 10.96 | 49.86 | 16.55 | 38.26 | 23.99 |
| Employees | 78.86 | 13.47 | 51.28 | 20.22 | 38.95 | 23.77 | 28.8 | 33.51 |
| Non-employed | 59.98 | 29.35 | 34.17 | 36.28 | 22.86 | 44.5 | 12.52 | 57.76 |
| Retired | 66.8 | 27.92 | 37.34 | 39.48 | 27.53 | 40.76 | 18.71 | 52.78 |

Source: SHIW 2008 – Weighted data. Sample: all household heads (N = 7977)

Table 5: Financial literacy by pension plans participation (2006)

| | Household head has pension plan | Household head has no pension plan | t-test |
|---|---|---|---|
| *Inflation* | | | |
| Correct | 65.24 | 44.03 | *** |
| Do not know | 5.74 | 16.71 | *** |
| *Interest* | | | |
| Correct | 74.92 | 67.20 | * |
| Do not know | 11.43 | 21.57 | *** |
| *Stocks* | | | |
| Correct | 77.08 | 60.08 | *** |
| Do not know | 15.17 | 23.51 | ** |
| *Overall performance* | | | |
| Correct on interest and inflation | 51.48 | 35.26 | *** |
| Number correct | 2.17 | 1.71 | *** |
| 3 correct | 42.92 | 27.62 | *** |
| At least one DK | 21.85 | 34.09 | *** |
| N obs | 188 | 1588 | |

Source: SHIW 2006 – Weighted data. Significance: *** p<0.01, ** p<0.05, * p<0.1. Sample: household head in the labour market in the age class 25-65 (N = 1776). The table reports the percentage of correct / DK answers in any question, by pension plan participation

Table 6: Financial literacy by pension plans participation (2008)

| | Household head has pension plan | Household head has no pension plan | t-test |
|---|---|---|---|
| *Inflation* | | | |
| Correct | 77.85 | 93.18 | *** |
| Do not know | 13.85 | 2.32 | *** |
| *Risk (HRS)* | | | |
| Correct | 50.79 | 68.38 | *** |
| Do not know | 19.51 | 10.91 | *** |
| *Risk 2* | | | |
| Correct | 38.73 | 57.74 | *** |
| Do not know | 23.89 | 10.93 | *** |
| *Overall performance* | | | |
| Number correct | 1.67 | 2.19 | *** |
| 3 correct | 28.40 | 46.81 | *** |
| At least one DK | 33.11 | 19.04 | *** |
| N obs | 471 | 2948 | |

Source: SHIW 2008 – Weighted data. Significance: *** p<0.01, ** p<0.05, * p<0.1. Sample: household head in the labour market in the age class 25-65 (N = 3419). The table reports the percentage of correct / DK answers in any question, by pension plan participation

Table 7: Multivariate analysis of pension plan participation in 2006

| | OLS | IV | OLS | IV |
|---|---|---|---|---|
| Number correct | 0.023*** | 0.137*** | | |
| | (0.01) | (0.04) | | |
| Three correct | | | 0.034* | 0.372*** |
| | | | (0.02) | (0.13) |
| Age | 0.027*** | 0.020** | 0.028*** | 0.022*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Age squared | -0.000*** | -0.000*** | -0.000*** | -0.000*** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Female | -0.071*** | -0.050** | -0.072*** | -0.042* |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| Primary | -0.073** | -0.106* | -0.063* | -0.019 |
| | (0.03) | (0.06) | (0.03) | (0.06) |
| Secondary | -0.060* | -0.125* | -0.046 | -0.040 |
| | (0.03) | (0.07) | (0.03) | (0.06) |
| Tertiary | -0.013 | -0.101 | 0.002 | -0.021 |
| | (0.04) | (0.07) | (0.03) | (0.06) |
| College | 0.004 | -0.096 | 0.021 | -0.010 |
| | (0.04) | (0.08) | (0.04) | (0.06) |
| Single | 0.003 | -0.003 | 0.004 | -0.000 |
| | (0.02) | (0.02) | (0.02) | (0.03) |
| Divorced | 0.065** | 0.048* | 0.066** | 0.041 |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| Widow(er) | 0.114** | 0.117** | 0.113** | 0.113** |
| | (0.05) | (0.06) | (0.05) | (0.06) |
| N children in house | -0.004 | -0.007 | -0.004 | -0.006 |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| H income quartile 2 | 0.052*** | 0.029 | 0.055*** | 0.040* |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| H income quartile 3 | 0.050*** | 0.019 | 0.055*** | 0.044** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| H income quartile 4 | 0.102*** | 0.059** | 0.107*** | 0.066** |
| | (0.02) | (0.03) | (0.02) | (0.03) |
| Home-owner | 0.016 | -0.004 | 0.019 | -0.000 |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| Self-employed | 0.015 | 0.004 | 0.018 | 0.024 |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| Constant | -0.555*** | -0.474*** | -0.561*** | -0.466*** |
| | (0.16) | (0.18) | (0.16) | (0.18) |
| N obs | 1776 | 1776 | 1776 | 1776 |
| Adj. R-Squared | 0.105 | | 0.102 | |
| F of instruments | | 17.67 | | 11.92 |
| Hansen J | | 0.759 | | 1.926 |
| Hansen J p-value | | 0.384 | | 0.165 |

Source: SHIW 2006. Linear probability model estimated by OLS/GMM. Robust std errors are reported in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1. Sample: household head in the labour market in the age class 25-65.

Table 8: Multivariate analysis of pension plan participation in 2008

| | OLS | IV | OLS | IV |
|---|---|---|---|---|
| Number correct | 0.033*** | 0.121*** | | |
| | (0.01) | (0.04) | | |
| Three correct | | | 0.058*** | 0.334*** |
| | | | (0.01) | (0.10) |
| Age | 0.018*** | 0.017*** | 0.019*** | 0.018*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Age squared | -0.000*** | -0.000*** | -0.000*** | -0.000*** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Female | -0.041*** | -0.032** | -0.043*** | -0.034** |
| | (0.01) | (0.02) | (0.01) | (0.02) |
| Primary | -0.047* | -0.092** | -0.034 | -0.046 |
| | (0.03) | (0.04) | (0.03) | (0.04) |
| Lower Secondary | -0.024 | -0.082* | -0.007 | -0.026 |
| | (0.03) | (0.04) | (0.03) | (0.04) |
| Upper Secondary | -0.001 | -0.079 | 0.019 | -0.019 |
| | (0.03) | (0.05) | (0.03) | (0.04) |
| College | 0.027 | -0.065 | 0.047 | -0.017 |
| | (0.03) | (0.06) | (0.03) | (0.05) |
| Single | 0.023 | 0.017 | 0.023 | 0.016 |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| Divorced | 0.021 | 0.013 | 0.022 | 0.016 |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| Widow(er) | -0.000 | 0.016 | -0.002 | 0.019 |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| N children in house | -0.002 | -0.004 | -0.002 | -0.005 |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| H income quartile 2 | 0.062*** | 0.049*** | 0.066*** | 0.060*** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| H income quartile 3 | 0.071*** | 0.046** | 0.075*** | 0.055*** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| H income quartile 4 | 0.105*** | 0.063** | 0.111*** | 0.066** |
| | (0.02) | (0.03) | (0.02) | (0.03) |
| Home-owner | 0.028** | 0.023* | 0.028** | 0.014 |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Self-employed | -0.051*** | -0.055*** | -0.051*** | -0.059*** |
| | (0.01) | (0.02) | (0.01) | (0.02) |
| Constant | -0.386*** | -0.366*** | -0.384*** | -0.341** |
| | (0.12) | (0.13) | (0.12) | (0.14) |
| N obs | 3419 | 3419 | 3419 | 3419 |
| Adj. R-Squared | 0.087 | | 0.085 | |
| F of instruments | | 33.88 | | 26.21 |
| Hansen J | | 0.705 | | 0.315 |
| Hansen J p-value | | 0.401 | | 0.575 |

Source: SHIW 2008. Linear probability model estimated by OLS/GMM. Robust std errors are reported in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1. Sample: household head in the labour market in the age class 25-65.

Table 9: Financial literacy by TFR destination

| | TFR in PF | TFR in firm | TFR: DK |
|---|---|---|---|
| *Inflation* | | | |
| Correct | 90.76 | 79.39 | 55.37 |
| Do not know | 3.24 | 13.46 | 29.04 |
| *Risk (HRS)* | | | |
| Correct | 66.04 | 50.45 | 41.98 |
| Do not know | 11.51 | 19.92 | 33.79 |
| *Risk 2* | | | |
| Correct | 53.73 | 38.10 | 27.91 |
| Do not know | 11.05 | 23.55 | 46.75 |
| *Overall performance* | | | |
| Number correct | 2.11 | 1.68 | 1.25 |
| 3 correct | 43.04 | 28.17 | 16.28 |
| At least one DK | 20.80 | 33.00 | 56.30 |
| N obs | 289 | 2,178 | 164 |

Source: SHIW 2008 – Weighted data. Sample: household heads working as employees aged 25-65.

Table 10: Probability of transferring TFR into a pension fund

| | Dependent var: TFR in PF (vs. firm, excluding DKs) | | Dependent var: TFR in PF (including DKs) vs. firm | | Dependent var: Explict decision (PF or firm) vs. DK | |
|---|---|---|---|---|---|---|
| Number correct | 0.021*** | | 0.004 | | 0.018*** | |
| | (0.01) | | (0.01) | | (0.01) | |
| Three correct | | 0.035** | | 0.019 | | 0.017* |
| | | (0.02) | | (0.02) | | (0.01) |
| Age | 0.007 | 0.007 | -0.004 | -0.004 | 0.012** | 0.013** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Age squared | -0.000 | -0.000 | 0.000 | 0.000 | -0.000** | -0.000** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Female | -0.030* | -0.030* | -0.026 | -0.026 | -0.003 | -0.004 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.01) | (0.01) |
| Primary | -0.043 | -0.044 | -0.162 | -0.162 | 0.108 | 0.112 |
| | (0.03) | (0.03) | (0.13) | (0.13) | (0.12) | (0.12) |
| Lower Secondary | 0.003 | 0.006 | -0.152 | -0.151 | 0.140 | 0.146 |
| | (0.03) | (0.03) | (0.13) | (0.13) | (0.12) | (0.12) |
| Upper Secondary | 0.010 | 0.015 | -0.154 | -0.154 | 0.149 | 0.158 |
| | (0.03) | (0.03) | (0.13) | (0.13) | (0.12) | (0.12) |
| College | -0.006 | -0.001 | -0.159 | -0.160 | 0.137 | 0.147 |
| | (0.04) | (0.04) | (0.13) | (0.13) | (0.12) | (0.12) |
| Single | -0.002 | -0.001 | -0.031 | -0.031 | 0.032* | 0.033** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Divorced | 0.017 | 0.018 | -0.018 | -0.019 | 0.035** | 0.036** |
| | (0.02) | (0.02) | (0.03) | (0.03) | (0.02) | (0.02) |
| Widow(er) | -0.017 | -0.020 | -0.009 | -0.008 | -0.009 | -0.012 |
| | (0.03) | (0.03) | (0.04) | (0.04) | (0.04) | (0.04) |
| N children in house | 0.009 | 0.009 | 0.006 | 0.005 | 0.003 | 0.003 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| H income quartile 2 | 0.065*** | 0.067*** | 0.052** | 0.052** | 0.006 | 0.008 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| H income quartile 3 | 0.078*** | 0.082*** | 0.047* | 0.047* | 0.028 | 0.032* |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| H income quartile 4 | 0.065*** | 0.070*** | 0.040 | 0.038 | 0.021 | 0.027 |
| | (0.02) | (0.02) | (0.03) | (0.03) | (0.02) | (0.02) |
| Home-owner | 0.047*** | 0.047*** | 0.007 | 0.006 | 0.041*** | 0.041*** |
| | (0.01) | (0.01) | (0.02) | (0.02) | (0.01) | (0.01) |
| Constant | -0.159 | -0.152 | 0.392* | 0.395* | 0.432** | 0.430** |
| | (0.14) | (0.14) | (0.21) | (0.21) | (0.17) | (0.17) |
| N obs | 2467 | 2467 | 2631 | 2631 | 2631 | 2631 |
| Adj. R-Squared | 0.069 | 0.068 | 0.035 | 0.036 | 0.030 | 0.026 |

Source: SHIW 2008. Std errors robust to heteroskedasticity are reported in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1. Sample: household heads working as employees aged 25-65.

Appendix

Table A1: Socio-demographic characteristics

| | 2006 | | | 2008 | | |
|---|---|---|---|---|---|---|
| | Mean | Median | Std. Dev. | Mean | Median | Std. Dev. |
| Age (years) | 57.646 | 58 | 15.613 | 58.240 | 58 | 15.828 |
| Age <=35 | 0.078 | 0 | 0.268 | 0.078 | 0 | 0.268 |
| Age 36-50 | 0.276 | 0 | 0.447 | 0.268 | 0 | 0.443 |
| Age 51-65 | 0.301 | 0 | 0.459 | 0.296 | 0 | 0.457 |
| Age 65+ | 0.344 | 0 | 0.475 | 0.358 | 0 | 0.479 |
| Female | 0.370 | 0 | 0.483 | 0.381 | 0 | 0.486 |
| No edu | 0.055 | 0 | 0.228 | 0.053 | 0 | 0.223 |
| Primary | 0.265 | 0 | 0.441 | 0.258 | 0 | 0.437 |
| Lower secondary | 0.282 | 0 | 0.450 | 0.287 | 0 | 0.452 |
| Upper secondary | 0.309 | 0 | 0.462 | 0.308 | 0 | 0.462 |
| College+ | 0.089 | 0 | 0.285 | 0.094 | 0 | 0.292 |
| Single | 0.116 | 0 | 0.320 | 0.113 | 0 | 0.317 |
| Married | 0.632 | 1 | 0.482 | 0.633 | 1 | 0.482 |
| Divorced | 0.071 | 0 | 0.257 | 0.073 | 0 | 0.261 |
| Widow(er) | 0.182 | 0 | 0.385 | 0.181 | 0 | 0.385 |
| Num H components | 2.517 | 2 | 1.265 | 2.496 | 2 | 1.256 |
| N children in house | 0.771 | 0 | 0.965 | 0.757 | 0 | 0.968 |
| Household total net income (th) | 31.893 | 26.217 | 27.276 | 32.344 | 26.702 | 24.357 |
| Home-owner | 0.700 | 1 | 0.458 | 0.707 | 1 | 0.455 |
| Employees | 0.348 | 0 | 0.477 | 0.345 | 0 | 0.475 |
| Self-employed | 0.076 | 0 | 0.266 | 0.073 | 0 | 0.260 |
| Retired | 0.454 | 0 | 0.498 | 0.465 | 0 | 0.499 |
| Not employed | 0.095 | 0 | 0.293 | 0.096 | 0 | 0.294 |
| North-west | 0.256 | 0 | 0.436 | 0.250 | 0 | 0.433 |
| North-east | 0.222 | 0 | 0.415 | 0.219 | 0 | 0.414 |
| Center | 0.203 | 0 | 0.402 | 0.206 | 0 | 0.404 |
| South | 0.209 | 0 | 0.406 | 0.218 | 0 | 0.413 |
| Isles | 0.111 | 0 | 0.314 | 0.108 | 0 | 0.310 |
| Household head has private pension plan | 0.061 | 0 | 0.239 | 0.061 | 0 | 0.240 |
| Economist in house | 0.024 | 0 | 0.153 | 0.023 | 0 | 0.150 |
| A household member uses a computer | 0.414 | 0 | 0.493 | 0.473 | 0 | 0.499 |
| Mortgage for house of residence | 0.100 | 0 | 0.300 | 0.092 | 0 | 0.289 |
| Father's education: upper secondary+ | 0.088 | 0 | 0.284 | 0.088 | 0 | 0.283 |
| % employees in firms <50 at regional level | 67.97 | 68.18 | 4.147 | 67.86 | 67.97 | 4.255 |

Source: SHIW 2006, 2008. Sample: all household heads

Table A2: First stage regressions and alternative instruments (2006)

| | I | | II | | III | | IV | |
|---|---|---|---|---|---|---|---|---|
| *FIRST STAGE – Dependent variable: financial literacy* | | | | | | | | |
| | *(a)* | *(b)* | *(a)* | *(b)* | *(a)* | *(b)* | *(a)* | *(b)* |
| A household member uses a computer | 0.348*** | 0.115*** | | | 0.410*** | 0.139*** | | |
| | (0.06) | (0.03) | | | (0.06) | (0.02) | | |
| Economist in house | 0.065 | 0.095 | 0.069 | 0.098 | | | 0.128 | 0.117* |
| | (0.14) | (0.06) | (0.13) | (0.06) | | | (0.14) | (0.06) |
| Father's education: upper sec+ | | | 0.020 | 0.039 | | | 0.061 | 0.055 |
| | | | (0.07) | (0.04) | | | (0.08) | (0.04) |
| Mortgage for house of residence | | | 0.234*** | 0.055* | | | | |
| | | | (0.06) | (0.03) | | | | |
| % employees in firms <50 at regional level | | | | | 0.020* | 0.011** | 0.021* | 0.011** |
| | | | | | (0.01) | (0.00) | (0.01) | (0.00) |
| N obs | 1776 | 1776 | 1776 | 1776 | 1776 | 1776 | 1776 | 1776 |
| Adj. R-Squared | 0.172 | 0.125 | 0.160 | 0.117 | 0.085 | 0.058 | 0.059 | 0.045 |
| *IV regression – Dependent variable: pension plan participation* | | | | | | | | |
| Number correct | 0.137*** | | 0.237** | | 0.154*** | | 0.276*** | |
| | (0.04) | | (0.12) | | (0.03) | | (0.10) | |
| Three correct | | 0.372*** | | 0.598* | | 0.390*** | | 0.435*** |
| | | (0.13) | | (0.36) | | (0.08) | | (0.11) |
| N obs | 1776 | 1776 | 1776 | 1776 | 1776 | 1776 | 1776 | 1776 |
| F of instruments | 17.67 | 11.92 | 5.06 | 2.37 | 29.74 | 19.54 | 3.74 | 4.65 |
| Hansen J | 0.759 | 1.926 | 3.947 | 4.002 | 0.016 | 0.256 | 3.391 | 2.636 |
| Hansen J p-value | 0.384 | 0.165 | 0.139 | 0.135 | 0.899 | 0.613 | 0.184 | 0.268 |

Source: SHIW 2006. Robust std errors are reported in parentheses. In panels III and IV standard errors are robust to clustering on regions. In columns (a) the dependent variable of the first stage is the number of correct answers; in columns (b) the dependent variable in the first stage in a dummy indicating three correct answers. Significance: *** p<0.01, ** p<0.05, * p<0.1. Sample: household head in the labour market in the age class 25-65. The usual regressors are included in regressions but not reported in the table.

Table A3: First stage regressions and alternative instruments (2008)

| | I | | II | | III | | IV | |
|---|---|---|---|---|---|---|---|---|
| *FIRST STAGE – Dependent variable: financial literacy* | | | | | | | | |
| | *(a)* | *(b)* | *(a)* | *(b)* | *(a)* | *(b)* | *(a)* | *(b)* |
| A household member uses a computer | 0.334*** | 0.121*** | | | 0.348*** | 0.125*** | | |
| | (0.04) | (0.02) | | | (0.06) | (0.02) | | |
| Economist in house | 0.211** | 0.108** | 0.228*** | 0.114** | | | 0.211** | 0.112* |
| | (0.09) | (0.05) | (0.08) | (0.05) | | | (0.10) | (0.06) |
| Father's education: upper sec+ | | | 0.139*** | 0.065** | | | 0.188*** | 0.078*** |
| | | | (0.05) | (0.03) | | | (0.06) | (0.03) |
| Mortgage for house of residence | | | 0.210*** | 0.059** | | | | |
| | | | (0.04) | (0.02) | | | | |
| % employees in firms <50 at regional level | | | | | 0.021 | 0.007 | 0.022 | 0.007 |
| | | | | | (0.02) | (0.01) | (0.02) | (0.01) |
| N obs | 3419 | 3419 | 3419 | 3419 | 3419 | 3419 | 3419 | 3419 |
| Adj. R-Squared | 0.211 | 0.128 | 0.202 | 0.122 | 0.099 | 0.065 | 0.086 | 0.058 |
| *IV regression – Dependent variable: pension plan participation* | | | | | | | | |
| Number correct | 0.121*** | | 0.266*** | | 0.144*** | | 0.187*** | |
| | (0.04) | | (0.08) | | (0.03) | | (0.05) | |
| Three correct | | 0.334*** | | 0.671*** | | 0.405*** | | 0.470*** |
| | | (0.10) | | (0.23) | | (0.07) | | (0.17) |
| N obs | 3419 | 3419 | 3419 | 3419 | 3419 | 3419 | 3419 | 3419 |
| F of instruments | 33.88 | 26.21 | 13.26 | 6.49 | 18.41 | 15.31 | 6.39 | 5.23 |
| Hansen J | 0.705 | 0.315 | 0.028 | 0.832 | 0.038 | 0.010 | 0.650 | 0.261 |
| Hansen J p-value | 0.401 | 0.575 | 0.986 | 0.660 | 0.846 | 0.921 | 0.722 | 0.878 |

Source: SHIW 2008. Robust std errors are reported in parentheses. In panels III and IV standard errors are robust to clustering on regions. In columns (a) the dependent variable of the first stage is the number of correct answers; in columns (b) the dependent variable in the first stage in a dummy indicating three correct answers. Significance: *** p<0.01, ** p<0.05, * p<0.1. Sample: household head in the labour market in the age class 25-65. The usual regressors are included in regressions but not reported in the table.