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Financial Literacy and Retirement Savings in Germany

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Abstract: The German pension reforms in 2001 and 2004 increased the importance of private supplemental savings for retirement. Calculating the appropriate retirement income needed and choosing the right product postulates some degree of financial knowledge, also referred to as financial literacy. This paper investigates the relationship between financial literacy and private retirement savings. Germans seem to have a good grasp of basic financial concepts. However, individuals with low education face some problems and at the same time seldom possess a private retirement account. This is different for women, who are less literate than men, but not less likely to save for retirement.

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INTRODUCTION

In the U.S., individuals have long been responsible for ensuring that they will have a decent income throughout old age. Private retirement saving plans and company pensions are an inherent part of retirement income. In Germany, old age provision is composed of three pillars, statutory pension representing the first pillar, company pension as the second pillar and the third pillar is private pension. However, until the pension reform in 2001, most Germans relied almost solely on their statutory pension entitlements. Only half of the workforce, subject to social insurance contributions, participated in an employee pension plan in 2001 (tns infratest 2007).¹ Since Germany is a country operating a pay-as-you go financed pension plan, scholars increasingly projected rising contribution rates as population aging would proceed. While, as a defined benefit plan, the net pension level would have stayed constant at 70 percent, the contribution rate would have risen from 19.1 percent in 2001 to about 23 percent in 2020 (Börsch-Supan and Wilke 2006).² Therefore, the aim of the pension reform in 2001 was to divide the burden more equally between the generations. This has been realized by a savings subsidy to make supplemental private or occupational pensions more attractive and through a change in the pension formula, leading to a decrease in the pension level. Three years later the next reform was to come, modifying the pension formula again, by implementing a sustainability factor accounting for the development of the system dependency ratio. These reforms fundamentally changed the character of the statutory pension scheme from a defined benefit to a quasi-notional defined contribution (NDC) plan (Börsch-Supan and Wilke 2006). The net pension level is now predicted to fall to 58.5 percent by 2030 (Börsch-Supan, Essig and Wilke 2005).

German households are now for the first time to a certain extent responsible for their retirement income.³ They have to ensure, that savings and pension entitlements suffice to achieve their desired standard of living when old. After the reforms, insurance companies and banks reacted promptly, offering a variety of retirement savings plans. In order to make optimal decisions about retirement plans, however, an appropriate level of financial knowledge and understanding is necessary. Otherwise many Germans will make suboptimal saving choices without recognizing the consequences of their actions. In the worst case, this could lead to a large drop in the standard of living that the individual has to live in poverty the rest of his/her life. Financial literacy is not only vital for the individual but also for market efficiency. Financial literate consumers also encourage competition between the financial institutions in the market. This entails innovation and ensures that financial products meet the requirements of the consumers (OECD 2005).

While the market economic consequences of financial illiteracy are important, they will not be the subject of this

paper. Instead, financial literacy and the ownership of private pension plans will be investigated on the individual level. Focusing on the relationship between financial literacy and private pensions is especially important since savings in private pension plans have a lower marginal propensity to consume than savings invested in short term saving contracts (Shefrin and Thaler 1992). Hence this is the only kind of savings devices which ensures that the savings in these accounts accumulates until retirement and is not spent before. In the light of a decreasing pension level in Germany, it is essential to be able to fall back on some extra savings to ensure the accustomed standard of living and to avoid poverty. The basis of the following analysis is the German SAVE-panel which for the first time included questions to assess financial literacy of the population in their 2007 survey. With these questions, it is possible to investigate how financially literate the Germans are and what determines if someone is literate or not. Additionally, owning a private pension plan will be related to the degree of financial literacy and a set of socio-demographic and other variables.

The paper will start with a short overview of the German pension system. This will make the paper easier accessible since the analysis and its interpretations are influenced by the features of the German system. Next, the theoretical background of the study will be provided. This chapter is followed by a literature review examining financial literacy as well as its behavioral consequences for the individual. Afterwards the underlying data of the paper will be described and the results of the descriptive statistics will be presented. In the proceeding section a discussion of the results follows and the last chapter of the paper concludes on the findings.

THE PENSION SYSTEM IN GERMANY

The German pension system composed of three pillars. The first and still most important pillar is the pay-as-you-go pension scheme. Everyone who is subject to social insurance contributions is covered by this scheme. The contribution rate is 19.9 percent and divided equally between employee and employer. As described in the introduction, the pension level of the pay-as-you-go scheme has decreased as a result of the pension reforms in 2001 and 2004. Self-employed and individuals earning not more than 400 € a month are not covered but could voluntarily participate in the scheme. Civil servants, however, are treated differently, they will receive a state pension (not integrated in one of the three pillars) without paying direct contributions. The state pension for civil servants has not faced noteworthy reforms and will not be described in more detail.

The second pillar is occupational pension. Retirement savings in occupational pension schemes are subject to downstream taxation which makes them attractive. Often employers also support savers with subsidies to their retirement saving plan. Since the Riester reform (pension reform in 2001), it is also possible to receive a state subsidy to occupational pension schemes.

The third pillar is private pension plans. Since the Riester reform, pension plans which meet certain requirements are subsidized by the government. In principle everyone saving at least 4 percent of his/her income within such a contract is entitled to a saving subsidy of 308 € plus 185 € for each child. For children born after 2007 the child subsidy has been increased to 300 €. Exceptions are individuals not subject to social insurance contributions, like self-employed, who are not entitled for savings subsidies. Civil servants, however, are entitled to the subsidy.

THEORETICAL FRAMEWORK

So far as I know, there is a lack of models which explicitly acknowledge the effect of financial education on saving behavior. Many modern theories on inter-temporal consumption and saving decisions are refinements of the life-cycle model of consumption which date back to Modigliani and Brumberg (1954). This model assumes that individuals act rationally and with foresight. Consumers are fully informed about all possible actions which could be taken and know their implications. Such an individual maximizes his/her lifetime expected utility subject to an inter-temporal budget constraint. The result of the model is smooth consumption over the life-cycle. People would save in times of high income and run down assets in times of low income, especially in old age. Accordingly, consumers expecting low income from the public pension scheme would have to save more during their working period as consumers expecting a high replacement rate.

However, decision making in this basic model requires a high degree of knowledge. Consumers have to form expectations about, among other things, future income, life expectancy, interest rates, inflation and stock returns. Furthermore, time preferences and risk aversion will influence the saving decisions of individuals. A low discount rate of the future would for example result in lower consumption today as compared to someone discounting the future at a high rate. Lacking even basic financial knowledge would make it impossible to gather all the relevant information and to get the calculations right to choose the optimal product.

So what could be the channels through which financial education and therefore financial literacy influence the optimization problem of the individual? Maki (2004) came up with three ideas. Firstly, financial education may lead to higher savings by reducing the household's discount rate. Secondly, financially literate consumers might be less risk averse since they know that riskier assets do better than other investments over the long term. He admits, however, that most models of saving under uncertainty would predict lower savings in this case. Lastly, his favored explanation is that financial education changes the knowledge about possible actions and their implications. The assumption that consumers are fully informed while maximizing their utility is therefore not applicable.

Clark et al (2006) also criticize the assumption that individuals are correctly informed about the various factors that determine wealth accumulation. If people are not correctly informed, it would follow that they will not achieve their retirement objectives. Each time an individual acquires new knowledge in some period of his/her working life, he/she will re-solve the optimization problem with new parameter values. Clark et al (2006) simulate the adjustments due to new information within their model of saving. If the individual for example discovers the return on stock is lower than previously known, then he/she can chose to keep the fraction of wage income he/she wants to consume during retirement unchanged and retire later, or reduce the fraction. A better understanding of riskiness of different savings instruments could either increase or decrease an individual's risk aversion and result in either a lower or a higher fraction invested in stock. The next chapter will provide an overview of empirical studies examining the influence of financial literacy on dependent variables like wealth accumulation and the ability to plan for retirement.

LITERATURE REVIEW

Studies measuring financial literacy

Several surveys have shown that financial illiteracy is widespread. Lusardi and Mitchell (2006) added a module on financial literacy into the 2004 U.S. Health and Retirement Study. The respondents of this longitudinal datasets are Americans over the age of 50. They found that half of these respondents were not able to answer two simple questions about interest rates and inflation correctly. Low financial literacy was especially prevalent among those with low education, women and the elderly. Using among others the same financial literacy questions as Lusardi and Mitchell (2006), Rooij, Lusardi and Alessie (2007) investigated the financial knowledge of Dutch households. They implemented basic and advanced literacy questions into the 2005 DNB Household survey. Their finding is that most of the respondents got the two questions on inflation and interest rates right (82.6 percent and 90.8 percent respectively). When it comes to answering questions on the time value of money and money illusion, the percentage of right answers decreases to about 70 percent. Lusardi and Mitchell (2007a) also added a set of similar questions into the Rand American Life Panel covering respondents aged 40 to 60, relatively high educated and earning relatively high income. About 25 percent of the respondents were not able to correctly answer the questions on interest compounding and the time value of money. They found that not only gender, education, race and income determines how financial literate an individual is but also the exposure to economics at school and company based financial education programs. More evidence on the widespread financial illiteracy on an international level can be found in Lusardi and Mitchell (2007b) and a study of financial education by the OECD (2005) which provide a review of studies conducted in several

countries like the U.S., Australia, Japan and the United Kingdom.

Studies investigating behavioral effects of financial literacy

Many empirical analyses of the effects of financial education encounter the endogeneity problem. If I would like to know how financial education influences for example retirement planning or stock market participation, it could well be that those who want to plan or to participate in the stock market invest in acquiring financial knowledge.

Rooij, Lusardi and Alessie (2007) investigate the relationship between financial literacy and stock market. The dataset used is the DNB Household Survey (DHS) which is constructed as a panel containing over 2,000 households. For this survey, they devised a special financial literacy module from which they afterwards constructed two literacy indexes: one based on basic literacy questions and the other on more advanced questions concerning the stock market. As an instrument for the advanced literacy index, they used the amount of education devoted to economics at school. According to the second stage estimation, the effect of financial literacy on stock market participation is positive and significant. Another variable which is exogenous to stock market participation is if the respondent received advice from parents on how to budget and save money. However, they did not find this variable to influence advanced literacy. Rooij, Lusardi and Alessie (2007) argue that this is evidence that earlier cohorts were seldom engaged with the stock market, such that they were not able to pass this experience down to their children.

Lusardi and Mitchell (2007a) use data from the Rand American Life Panel and created a financial literacy index by combining basic and sophisticated financial literacy questions. They estimate the relationship between financial literacy and retirement planning by OLS and two stage least squares, thereby considering a set of socio-demographic control variables. Their instrument for financial literacy which must be exogenous to planning is the amount of school education which had been devoted to economics. After carrying out the instrumental variable approach, they found the financial literacy index to be significantly positive and much larger than it was in the OLS regression. Lusardi and Mitchell (2007a) also tried another instrument, if one of the employers where the respondents worked for did offer financial education seminars. Using this instrument affirms previous results. Lusardi and Mitchell argue that the effect of financial literacy on planning is especially important since planning is a significant determinant of wealth (Lusardi, 2003; Lusardi and Mitchell, 2007c).

The effect of financial literacy on planning had also been investigated by Lusardi and Mitchell (2006). Based the 2004 Health and Retirement Study (HRS), they show that there is a positive relationship between financial literacy and planning. By adding demographic variables to the probit regression, however, only the knowledge on risk diversification has a significant influence on planning. Correct answers on the compound interest or the

inflation question do not influence planning. Furthermore, Lusardi and Mitchell (2006) investigate the effect of financial literacy on wealth and stock ownership. To account for the possible endogeneity of financial education, they performed regressions on quartiles of the wealth distribution. The finding is a positive correlation between financial literacy and wealth for the first two quartiles of the wealth distribution. For stock ownership, especially, knowledge on risk diversification is an important predictor.

Several studies related to this topic measure the behavioral effects of financial education seminars at the workplace or financial education at the school level.⁴ This relationship becomes clear, since financial education is supposed to amplify financial knowledge and hence enhance financial literacy within the population.

Bernheim and Garrett (2003) find that the provision of financial education at the workplace does increase the general rate of savings as well as contributions to retirement saving plans, especially for individuals who saved too little before the seminar. A positive effect of financial education but especially for individuals with low education and those with low wealth has also been found by Lusardi (2002). While Lusardi's (2002) findings are generated from the HRS, Bayer et al (1996), basing their analysis on data from the KPMG Peat Marwick Retirement Benefits Survey, could show a similar pattern. Using cross-sectional variation, they found that education programs were particularly effective in increasing the contribution and participation rate in retirement plans of not highly compensated workers.

Investigating the effects of exposing employers to a benefit fair, Duflo and Saez (2003) only found modest effects of the fair on retirement savings. Instead they detected peer effects because colleagues of the fair attendees who themselves did not attend the fair changed their retirement saving behavior accordingly. Clark and d'Ambrosio (2003, 2008) report that after a retirement seminar, employees stated the intention to increase retirement savings and retirement age. Interviewing the same individuals a few months later, however, revealed that only a few translated their intentions into actions. The existence of a gap between intention and action has also been confirmed by Laibson, Repetto and Tobacman (1998).

Turning to financial education at school, Bernheim, Garrett and Maki (2000) investigate the long term effects of mandates to teach topics related to financial decision making at high school level. Since not all states adopted the mandate at the same time, they were able to exploit the cross-state variations over time by using an approach similar to differences-in-differences. They found that individuals who were exposed to the mandate when young saved more and accumulated more wealth when they reached adulthood. A study by Mandell (2005) measures the results of financial courses on high school seniors. The dataset employed is the 2004 U.S. Jump\$tart survey. He found that student's financial literacy scores did not improve after the course but still they 'end up more savings orientated than those who have not had such a course' (Mandell, 2005). This result contradicts the

findings of Lusardi and Mitchell (2007a) and Rooij et al (2007) who found that the exposure to economics at school has a positive influence on financial literacy in adulthood.

Unfortunately, the availability of datasets which contain variables on financial literacy and saving are rarely available. Most surveys conducted on this topic are administered in the U.S., where the importance of financial literacy has come to the attention of researchers and politicians already in the 1990s (Bernheim 1995, 1998). In Germany the importance of private savings for retirement is a recent phenomenon which began, as mentioned in the introduction, with the pension reform in 2001 and 2004. With these reforms, the question arises if German households possess the knowledge to make appropriate savings decisions.

Familiar German datasets like the German Socio-Economic Panel provides neither a good data source to investigate saving decisions or retirement provision, nor does it allow constructing an index for financial literacy. Furthermore, the German income and consumption sample (Einkommens- und Verbrauchsstichprobe) does provide extensive information on the saving habits of the population and about private and statutory pension entitlements but lacks variables measuring financial literacy. A ray of hope for the analysis of the effects of financial literacy offers the SAVE study of the Mannheim Research Institute for the Economics of Aging, which added questions to assess financial literacy into the 2006 wave. This is also the dataset which will be used in the following analysis.

DESCRIPTIVE ANALYSIS

In this chapter, it will be investigated how financial literacy is spread among the German population and how it influences private retirement savings. Unfortunately, it is not yet possible to draw any causal inference. As already mentioned in the literature review, it is not clear which way causality goes. The analysis of the effect of financial literacy on owning a supplemental private pension plan or capital life insurance faces the same problems as analyzing the effects of financial literacy on planning (Lusardi and Mitchell 2007a) and stock ownership (Rooij, Lusardi and Alessie 2007). In both papers the authors addressed the problem by using the amount of education which had been devoted to economics at school as an instrument for financial literacy. A comparable instrument for the following analysis is not yet available; however, I might be able to address this problem in future work.⁵

Data

The database of the analysis will be the SAVE panel, a dataset focusing on savings and old-age security in Germany (Börsch-Supan et al 2008). Starting with the first wave in 2001, the SAVE panel actually has arrived at a stable panel since 2005. The data contains a wide range of socio-demographic and psychological variables from about 2900 households, which completed the questionnaire in 2007.

The following analysis will be based on the 2007 survey which for the first time asks questions to assess financial literacy of the respondents. Since I am interested in among others the relationship between financial literacy and retirement provision, I exclude pensioners. This has been done for two reasons. Firstly, they did not answer the questions, which constitute the dependent variable (expected sources of income when retired). Secondly, they were hardly affected by decreasing pension levels and increasing retirement ages. Hence, it was not necessary to have a supplemental private pension. Therefore the correlation between private pensions and financial literacy for these people should be small. Respondents still in education or apprenticeship are also excluded, since they might not have the financial resources to save for retirement.

The remaining sample consists of 1806 individuals, 44.5 percent being male and 55.5 percent being female. The age of the respondents ranges from 20 to 95 years with a mean age of 44.7 years. If not stated otherwise, weights will be used for all descriptive statistics. Weights have been calculated dependent on age and income, comparing SAVE to the Mikrozensus (Schunk 2007).

Who is financially literate?

The SAVE survey asks three questions to assess the financial literacy of the respondents. However, it is questionable if these three questions are sufficient to assess the level of financial literacy within the population. A much more comprehensive module on financial literacy has been included in the DNB Household Survey (DHS) analyzed by Rooij, Lusardi and Alessie (2007). They also examine the measurement of financial literacy and potential problems of financial literacy data. Nevertheless, the following analysis will be based on only three questions to test financial literacy since there is no dataset with more information available.

1. Interest Calculation

Suppose you had \$100 in a savings account and the interest rate was 2 percent per year. After 5 years, how much do you think you would have in the account if you left the money to grow? More than \$102, exactly \$102, less than \$102

2. Inflation

Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?

3. Diversification

Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund." Right, wrong, don't know.

A nice feature of these three questions, however, is that they were also part of the Dutch DHS as well as of the American HRS, which allows a comparison of these three countries. Table 1 shows that Germans are in all aspects more financially literate than Americans. The least variation can be observed for the knowledge of risk diversification. On this question, Dutch households score lowest with only 48.2 percent of the respondents able to answer this question correctly. There is not much difference between Dutch and Germans when it comes to interest calculations and inflation. While on the first question the Dutch households are more knowledgeable, on the second question, it is the other way round.

TABLE 1

Financial Literacy in The Netherlands, the USA and Germany

	The			
	Netherlands	Germany	USA	Germany
	22-90 years	22-90 years	>=50 years	>=50 years
Correct on interest	90.8	85.69	67.1	82.17
Correct on inflation	82.6	86.04	75.2	87.05
Correct on diversification	48.2	61.04	52.3	56.76

a unweighted data

b results for the Netherlands taken from Rooij, Lusardi and Alessie (2007)

c results for the USA taken from Lusardi and Mitchell (2006)

TABLE 2

Gender vs. Financial Literacy (N=1806)

	interest	inflation	diversification	How many questions correct?			
				0	1	2	3
male	92.03	88.22	69.99	2.74	8.41	24.73	64.14
female	85.02	81.39	58.50	4.16	14.53	33.53	47.77

TABLE 3

Education vs. Financial Literacy (N=1806)

	interest	inflation	diversification	How many questions correct?			
				0	1	2	3
lower secondary school (Haupt-Volksschule)	78.47	75.91	46.96	8.75	18.4	35.6	37.25
middle secondary school (Realschule)	93.47	83.24	66.02	1.41	10.75	31.57	56.28
middle secondary school (Polytechnische Oberschule)	87.52	89.06	59.14	1.60	12.37	34.76	51.28
upper secondary school (Fachhochschulreife)	88.64	87.44	74.27	2.54	8.75	24.51	64.19
upper secondary school (Abitur)	94.92	93.61	82.25	0.61	4.89	17.36	77.14

By investigating financial literacy among the German population, the results are not much different from other studies on this topic. More males are able to answer all three questions correct than females and a higher educational level can be associated with higher scores on financial literacy questions (Table 2 and 3). An exception constitutes the middle secondary school (Polytechnische Oberschule), which has been the secondary school in the former German Democratic Republic (GDR). After the 1990 reunification of the GDR and the

Federal Republic of Germany (FRG), this school had been integrated into the middle secondary school (Realschule), which had been present in the FRG. Since school leavers of the Polytechnische Oberschule belong to an older generation, it is comprehensible that not many are able to answer the question on risk diversification. Only 61.58 percent of the age group 61 to 70 years was able to get the question on risk diversification right. The reason is likely to be that they had not grown up in a time where many households invested in the stock market. The situation is different with the question on inflation, where older respondents were more confident than younger respondents (Table 4).

TABLE 4

Age vs. Financial Literacy (N=1806)

	How many questions correct?						
	interest	inflation	diversification	0	1	2	3
20-30 years	91.73	75.71	62.37	2.1	19.87	24.13	53.89
31-40 years	91.02	85.03	68.04	2.04	8.99	31.56	57.41
41-50 years	89.30	85.51	63.55	3.99	10.08	29.53	56.41
51-60 years	84.53	88.96	63.21	3.52	9.77	33.17	53.53
61-70 years	80.63	89.83	61.58	3.89	13.99	28.31	53.81

TABLE 5

Talking about financial matters (N=1806)

	How many questions correct?			
	0	1	2	3
<i>relatives</i>	22.58	32.54	33.7	37.75
<i>bank</i>	16.44	15.68	29.69	36.87
<i>friends</i>	18.04	22.62	24.36	28.08
<i>colleagues</i>	1.20	3.49	5.16	9.89
<i>neighbors</i>	1.38	1.28	2.30	2.03
<i>nobody</i>	55.36	47.18	36.51	32.38
<i>n</i>	62	197	522	1025

A further question asks ‘With whom do you talk about financial matters?’ Respondents were allowed to check as many as apply. Evident from Table 5 is that financially literate people talk a lot about financial matters.⁶ Be it relatives, banks, friends or colleagues, financially literate people discuss financial matters almost with everyone. Only 32.38 percent do not talk to any of the persons listed in the questionnaire. With decreasing financial literacy, financial talks become scarce.

The determinants of financial literacy are further investigated using a maximum-likelihood generalized ordered logit estimation (Williams 2005). The data used is not weighted as it will be in all multivariate regressions throughout this paper. Furthermore, all estimations were done twice, first with imputed data and second using the data without imputations to validate the results (Table 6).⁷ The dependent variable can take on three values: none or one question, two questions or three questions correct. On the right hand side, I control for some socio-demographic variables: education, kind of employment and family background. Both regressions (imputed or not) indicate a positive relationship between education and financial literacy. Additionally being male and having a high net household income increases the probability of answering all three questions correct. Respondents having a father who planned for the future are also more likely to get all three questions right. Adding variables on stock market participation and private retirement provision to the estimation does not change the result but makes the causality problem clear.⁸ Both variables seem to have a positive influence on financial literacy. Next, private pension provision will be the center of the investigation.

TABLE 6

Financial Literacy

1st equation	<u>with imputations</u>			<u>without imputations</u>		
	n=1806			n=1437		
	se			se		
female	-0.574	0.115	***	-0.709	0.132	***
age	0.109	0.301	***	0.018	0.035	
age^2	-0.001	0	***	0	0	
log of income	0.463	0.091	***	0.576	0.108	***
lower secondary_d1	reference group					
middle secondary_d2	0.747	0.13	***	0.713	0.149	***
middle secondary_d3	0.634	0.181	***	0.628	0.209	***

upper secondary_d4	0.84	0.191 ***	0.724	0.219 ***
upper secondary_d5	1.437	0.165 ***	1.306	0.185 ***
white- or blue collar_d1	reference group			
civil servant_d2	-0.098	0.228	-0.133	0.254
self-employed_d3	0.302	0.181 *	0.287	0.21
pocket money	0.024	0.014 *	0.016	0.016
spend p. money immediately				
plan father	0.041	0.019 **	0.049	0.022 **
plan mother	-0.024	0.02	-0.039	0.023 *
talk to relatives	0.198	0.109 *	0.248	0.123 **
talk to colleagues	0.619	0.231 ***	0.492	0.246 **
talk to bank/insurance	0.348	0.945 ***	0.689	0.219 ***
<hr/>				
2nd equation				
age	0.016	0.03		
age^2	0	0		
talk to bank/insurance			0.257	0.126 **
<hr/>				
Pseudo R^2	0.091		0.088	

A. coefficients ordered log odds

B. additional explanatory variables which are not significant: being a German, living in the western part of Germany, full-time employed, part-time, <15 hours, sometimes employed, not employed, health, spend pocket money immediately, planning mother, talk to friends, talk to neighbors.

Private Pension Provision

The number of Riester pension contracts has increased since its introduction in 2001 from 1.4 million to 10.76 in 2007 (Bundesministerium für Arbeit und Soziales 2008). Who belongs to these individuals saving voluntarily for retirement on top of their statutory pension entitlements?⁹ These voluntary retirement savings are not restricted to Riester pension accounts but also comprise capital life insurance contracts or any other kind of private pension schemes.¹⁰ Table 7 shows that about 69 percent of the self-employed own a private retirement plan or capital life insurance. This is different for white-collar workers and civil servants; 60 percent own a

private retirement account on top of their statutory pension entitlements. Moreover, about 47 percent of blue-collar workers and 33 percent of the unemployed have a supplemental pension scheme. From individuals working full-time, 59 percent own a supplemental pension. This decreases to 55 percent for those who work less than 15 hours.

The pattern of education is clear: the higher the educational attainment, the more individuals of the respective group own a supplemental pension plan.¹¹ A comparison of individuals with different financial literacy levels shows that there is not a large difference between having zero, one or two questions right. While about 40 percent of this group of respondents own a supplemental pension insurance, it is 59 percent of the respondents getting all three questions right. As expected is also distribution of voluntary retirement savings between age groups. About 60 percent of the individuals 20-40 years have a supplemental pension arrangement, while this decreases to 43 percent for the 51 to 60 years old. Furthermore, there is hardly a difference in voluntary retirement savings between women and men.

A logistic regression containing a large set of explanatory variables shall help to analyze the correlations between retirement savings and possible determinants (Table 8). The dependent variable is one if someone owns a private pension plan or a capital life insurance and zero otherwise. On the right hand side, control variables constitute a large set of socio-demographics, information about the respondents experience with money in the past, his/her expectations about income in the future, his/her time preference and risk aversion with respect to financial matters. With this large set of control variables, unobserved heterogeneity should be reduced as far as possible. However, as mentioned before, it is not possible to eliminate the potential endogeneity of the financial literacy variables.

TABLE 7

Who has private pension (or capital life-insurance)?

(N=1806)

	%	n
<hr/>		
Financial Literacy		
0 correct	40.05	62
1 correct	37.35	197
2 correct	43.79	522
3 correct	58.90	1025

blue-collar worker	46.81	375
white-collar worker	60.02	736
civil servant	60.07	111
farmer	68.14	7
freelancer	59.76	58
self-employed	68.80	104
helping family member	45.81	17
not employed	32.64	398

full-time >35 hours	59.32	563
part-time 15-35 hours	54.57	280
less than 15 hours	37.01	963

male	53.24	804
female	49.61	1002

20-30 years	58.67	232
31-40 years	61.63	416
41-50 years	52.32	601
51-60 years	43.03	415
61-70 years	18.45	115

lower secondary school (Haupt- Volksschule)	40.17	517
middle secondary school (Realschule)	52.3	488
middle secondary school (Polytechnische Oberschule)	46.67	261
upper secondary school	61.14	166

(Fachhochschulreife)

upper secondary school 64.42 374

(Abitur)

TABLE 8

Private retirement provision

	<u>with imputations</u>		<u>without imputations</u>	
	n=1692		n=1157	
	se		se	
interest	0.005	0.2	0.026	0.252
inflation	0.017	0.179	-0.009	0.229
diversification	0.092	0.119 ***	0.108	0.147 ***
female	0.018	0.128	0.062	0.16
age	0.021	0.039 **	0.007	0.05
age^2	0	0 ***	0	0
company pension	0.117	0.164 ***	0.09	0.202 *
log of income	0.09	0.121 ***	0.142	0.163 ***
married_d1	reference group			
married but seperated_d2	-0.143	0.327 *	-0.124	0.415
single_d3	0.036	0.165	0.061	0.2
divorced_d4	0.014	0.175	-0.043	0.218
widowed_d5	-0.307	0.447 ***	-0.305	0.539 **
white- or blue collar_d1	reference group			
civil servant_d2	-0.024	0.231	-0.054	0.273
self-employed_d3	0.149	0.202 ***	0.094	0.254
full-time_d1	reference group			
part-time_d2	0.006	0.171	0.008	0.216
<15 hours_d3	-0.005	0.218	0.036	0.282
sometimes_d4	-0.286	0.537 **	-0.179	0.762

not employed_d5	-0.261	0.162 ***	-0.22	0.201 **
higher income	0.018	0.019 ***	0.023	0.023 ***
<hr/>				
Pseudo R ²	0.119		0.115	
<hr/>				

a. coefficients are marginal effects after logit

b. additional explanatory variable which are not significant: being German, living in the western part of Germany, children, the interaction of children and age of the respondent, log of real estate, education, health status, receiving pocket money when young, spending all pocket money immediately, risk aversion in money management, time preference, father planned for the future, mother planned for the future.

Despite this large set of control variables, owning a private retirement savings plan and the knowledge of risk diversification are highly correlated. Knowledge of interest calculation or inflation on the other hand seems not to be relevant for holding a retirement savings account. The effect of age is only significant in the regression with imputed data, indicating that the probability of having a private retirement plan increases with age, but at a decreasing rate. Being male or female does not influence the probability of retirement saving. Surprisingly, there is no correlation between education and retirement savings. Since net household income is positively correlated with owning a private pension plan, this effect might be captured by a larger income of individuals with higher educational attainments. Being self-employed increases the probability of having a private pension account while being not employed decreases the probability.¹² Expecting an income this year (2007) is positively correlated with owning a private pension plan.

DISCUSSION

The descriptive statistics support earlier works, which found that low education and being female is associated with lower levels of financial literacy. While the difference between the genders is not too worrisome, the difference between lower secondary school and upper secondary school is. Respondents with lower secondary education score much worse on the financial literacy questions and additionally only 40 percent of these people own supplemental pension plan. If one would like to increase financial literacy of the German population, one should target programs to the less educated or implement financial education classes into the curriculum of lower secondary schools. Looking at the financial knowledge of many Americans and the knowledge of risk diversification of the Dutch, the German population can be said to be quite literate when it comes to financial matters. However, it could also mean that the wrong questions had been asked to assess financial literacy.

By designing questions to assess the financial literacy of the population, researchers have decided which kind of knowledge determines if someone is financial literate or not. The basic and advanced literacy questions in Rooij, Lusardi and Alessie (2007) are questions among others on interest compounding, inflation and the working of stock markets. These questions are quite general and not targeted at the population of a specific country. However, it might be necessary to consider the differences between countries when designing a questionnaire. To be a financially literate German and therefore able to make optimal savings decisions, it is for example vital to know how the pension system in Germany is organized. In the German old-age-provision report (Vorsorgereport), it is said that for the optimal decision on private retirement provision, it is important to know the amount of old age provision needed, to know which financial products are available and how they work, and the competence to save and to keep book. To ensure that individuals are equipped with these resources, financial education would be necessary (Reifner, Tiffe and Turner 2003). A representative TNS-Emnid study on behalf of Canada Life (2007) among 1012 respondent aged 18 to 60 found that about half of the respondents would not be able to explain what a Riester pension is. Given that the Riester pension has been advertised since its introduction after the reform in 2001 and its importance in the second and third pillar of the German old-age insurance system, it is alarming that half of the respondents did not know enough to explain what it is.

Now, I will discuss the finding that financially literate people talk more about financial matters than less literate people. It has to be noted, that it is not clear from the data, if talking about financial matters increases financial literacy or if financial literate people like to talk about financial matters. Rooij, Lusardi and Alessie (2007) investigated a similar set of questions within the DHS and linked it to basic and advanced literacy quartiles. They found that individuals with low basic financial literacy rely on family and friends as source of information while more literate individuals rely on newspapers, financial magazines or a professional advisor. The effects were even stronger when regarding the advanced literacy quartiles. On the basis of the HRS, Lusardi and Mitchell (2006) found that individuals who use more sophisticated tools like consulting a financial planner instead of friends are more likely to answer the financial literacy questions correct. I also find that financial literate people are talking to advisors from banks and insurance companies considerably more often than financially illiterate people.

It is not surprising that many self-employed have private retirement insurance, since this group is not mandated to be a member of the statutory pension system. Hence, most self-employed do not possess any pension claims against the statutory pension system. Astonishingly, however, as many civil servants own a supplemental pension plan as white-collar workers. Civil servants are not hit by the 2001 and 2004 pension reforms and hence will not experience a drop in their pension level. The reason for this development could be the expectation of falling pension levels or the windfall gain of receiving a savings subsidy when contracting a Riester pension

plan.

About 4 percent more men have a voluntary retirement plan than women. This difference is not large if one considers that women often work part-time or stay at home to look after the children. Therefore they are more likely to be in the group working less than 15 hours a week, from which only 37 percent own a supplemental pension account.¹³ How could the small difference between men and women then be explained? Firstly, the subsidy for each Riester pension plan is also dependent on the number of children in the household and as a default paid to the mother's Riester pension plan.¹⁴ Secondly, it is necessary to save 4 percent of gross income to be entitled to the full subsidy. Since women generally earn less than men, they have to save less in absolute amounts than men to get to the full subsidy. Women therefore have a greater incentive to file a Riester pension contract.

CONCLUSION

Since the pension reforms in 2001 and 2004, the pension level of the state pay-as-you-go pension system decreased and is likely to decrease further in the future. Individuals are therefore increasingly responsible to provide for their own retirement if they would like to enjoy their accustomed standard of living when old. However, the calculation of amount of pension needed when old and choosing the optimal pension plan requires a high level of financial knowledge. Individuals need to build expectations on inflation, their retirement age, future income and share prices. Moreover, finance mathematical tools are needed in order to calculate the optimal amount of savings to reach the desired standard of living when old. A lack of these skills would, according to the theory of saving, lead to suboptimal savings decisions.

Findings from America and other countries suggest that financial illiteracy is widespread. A comparison of similar survey questions to assess the literacy level of the population among the U.S., the Netherlands and Germany showed that Germans scored best on these questions. These results should nevertheless not be taken at face value since they are only based on three questions. By designing questions to assess the financial literacy of a specific population, it would be advisable to include country specific questions besides general questions on inflation, interest compounding and the stock market.

Assessing the influence of financial literacy on the behavior of individuals is not an easy task. There are not many datasets which contain variables on socio demographics, savings and financial literacy and, if they contain these variables, it is problematic to determine the direction of causality. Studies examining the consequences of financial literacy on retirement planning and stock ownership instrumented financial literacy by the amount of time devoted to economics at school (Rooij, Lusardi and Alessie 2007, Lusardi and Mitchell 2007a). Both

studies found that the causality goes from financial literacy to planning and stock ownership respectively and not the other way round.

On the basis of the German SAVE-panel, I investigated the literacy levels of German households and the relationship between financial literacy and the ownership of private retirement plans. It has been shown that knowledge of interest calculation and the effects of inflation are not correlated with owning a private pension plan. Understanding the concept of risk diversification on the other hand is highly correlated. Interpreting the result as having found a causal relationship from the knowledge of risk diversification on private pensions is due to the endogeneity of financial literacy not yet possible. While overall the Germans scored quite high on the financial literacy questions, this was not the case for individuals who attended the lower secondary school. This is worrisome since they not only lack basic financial knowledge but they are also the group in which only 40 percent own a private supplemental pension plan. Reasons could be that they are not able to calculate their pension entitlements or that they are not aware of all kinds of retirement savings plans available to them. Women on the other hand scored considerably worse on the financial literacy questions than men, but almost as many women as men own a private retirement account. Knowledge of the savings subsidy coupled with a Riester pension account might have been an incentive for women to save for retirement. Seminars on basic financial skills and retirement provision targeted at individuals with low education might be able to support them in deciding on the right product and the right amount of private retirement savings.

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- 1 Not subject to social insurance contributions are the self-employed and employees earning less than 400 € a month.
- 2 The replacement rate refers to an individual who has worked 45 years and earned the average net earnings of all current workers.
- 3 Apart from the self-employed, who were responsible for their retirement income before, and the civil servants, who have their own pension scheme which is not affected by the reforms.
- 4 Alle autoren zum thema auflisten Hilgert, not reviewed Marianne and Hogarth (2003)
- 5 It could be possible to exploit the variation in curricula between the 16 federal states of Germany to follow the approach of Bernheim, Garrett and Maki (2001).
- 6 Financially literate people are individuals who got all three financial literacy questions correct. Illiterate individuals on the other hand were not able to answer two questions correct.
- 7 Missing data has been imputed using a multiple imputation technique generating five datasets (Schunk 2007). Each of these datasets should be analyzed and combined to incorporate missing-data uncertainty. In this paper, only one dataset has been used so far, hence standard errors of the estimations may be too low. To validate my results, I did a second estimation without using imputed variables. In future work, the five datasets will be combined.
- 8 Results not shown but can be obtained from the author upon request.
- 9 As addressed in the description of the German pension system, civil servants, freelancers, self-employed and helping family members are not compulsorily insured in the statutory old age insurance.
- 10 Voluntary retirement savings, retirement savings account and private pension plan are used interchangeably and comprise all kinds of private pension plans and capital life insurance.
- 11 An exception is the middle secondary school (Polytechnische Oberschule).
- 12 The effect is significant at the 5 percent level in the regression with imputed data and almost significant with the non-imputed data.
- 13 76 percent of the 563 individuals working less than 15 hours a week are women.
- 14 If the couple agrees on paying the subsidy to the father, they can request to change the default.