

Effects of actual and perceived financial literacy skills on financial well-being at retirement

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THE AIMS OF THE PAPER

Studies have not explained fully how financial literacy, decision making skills and the diverse forms of financial literacy overconfidence interact with each other to explain households' actual and perceived financial well-being at retirement. This study aims to map the interactions among these constructs within the elderly population.

METHODOLOGY

In the framework of a larger assessment on subjective well-being and its antecedents at retirement, three hundred retired people between the age of 65 and 85 filled out a questionnaire in their home in Hungary in March 2019.

MOST IMPORTANT RESULTS

Elderly people are overconfident in their financial literacy skills both on absolute and relative levels. Perceived financial literacy is a better predictor of financial situation than actual financial literacy. However, financial literacy overconfidence relative to others harms elderly people's financial situation. Subjective financial well-being is mainly driven by the actual financial situation. Decision making skills play an important role in the calibration of financial literacy skills and have an additional direct effect on the subjective level of financial well-being. Our outcomes reinforce that it is indeed worth promoting programs helping elderly people acquiring domain-specific financial knowledge. These programs may lead to better financial situation and higher self-efficacy. Moreover, our findings imply that it would be worthwhile for programs to concentrate on the calibration of financial knowledge vis-à-vis others.

RECOMMENDATIONS

To complement the mainstream literature, the study examines the forms of overconfidence and their effects on financial well-being separately and concentrates on the elderly population.

Keywords: financial literacy skills, financial well-being, overconfidence, retirement

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INTRODUCTION

Over their life course, most of the adult population are challenged by a broad range of financial decisions varying in their complexity and difficulty. We can say that these financial challenges are answered optimally if their outcomes are in-line with the self-interest of the decision-maker; i.e. her perceived financial and general well-being increases. In the literature, objective financial situation and perceived financial well-being are both considered important antecedents of subjective general-well-being (Dolan & White 2008, Netemeyer *et al.* 2017). Hence, the ability to make and undertake optimal financial decisions is an essential aspect of the independent living and subjective well-being of elderly adults and a pressing concern of the ageing societies. Solving complex financial tasks require financial literacy skills and the ability to apply those skills consistently in compliance with self-interest (Carpenter & Yoon 2015, Bruine de Bruin *et al.* 2012, Hershey *et al.* 2015). For the latter, general decision making skills and a well-calibrated view on related knowledge and skills seem to be critical (Bruine de Bruin *et al.* 2012, Ajzen 2002, Alba & Hutchinson 2000, Cokely *et al.* 2018, Kahneman 2011). At the same time, the general decline in cognitive abilities in advanced age fuels worries about the abilities of elderly adults to make good financial decisions (Korniotis & Kumar 2011). However, so far, studies have failed to fully explain how perceived and actual financial literacy and decision making skills interact with each other to explain the financial well-being of households, especially in the case of elderly people (Netemeyer *et al.* 2017, Anderson *et al.* 2016). In this study, we try to map these relationships.

Financial knowledge and basic numeracy skills, often referred to in the literature as financial literacy, are arguably the basic pillars of financial behavior and outcomes (Hershey *et al.* 2015, Lusardi *et al.* 2017, Smith *et al.* 2010, Banks *et al.* 2010). Financial literacy was estimated to explain about 30-40 percent of retirement wealth inequality in the United States (Lusardi *et al.* 2017). The literature on the relationship between age and financial literacy is typically informed by the theory of fluid and crystallized intelligence and the general decline in cognitive abilities (Finke *et al.* 2016, Gamble *et al.* 2014, 2015, Boyle *et al.* 2013, Lichtenberg *et al.* 2018). In contrast, some researchers argue that any decline in cognitive abilities is negligible compared to the benefit of specialized knowledge, skills and practice in decision making that may come with

age (Cokely *et al.* 2018, Li *et al.* 2013, Ericsson 2006, Hershey *et al.* 2003). For financial abilities, numeracy skills are interesting not only because these skills are antecedents of financial literacy but because the ability to understand and process numerical information seems to affect general decision making skills too (Lipkus *et al.* 2001, Peters *et al.* 2006, Reyna *et al.* 2009). Decision making skills stand for the quality of decision making across domains. High decision making skills are linked to good, normatively superior decision outcomes in the field of financial decisions (Finke *et al.* 2016, Bruine de Bruin *et al.* 2007). Numeracy skills are linked to fluid intelligence and working memory but unlike fluid intelligence, they solicit domain-specific knowledge and crystallized intelligence as well (Peters *et al.* 2006, Barrouillet & Lépine 2005). Decreased numeracy, like decreased fluid intelligence, was associated with older age (Smith *et al.* 2010, Galesic & Garcia-Retamero 2010, Winman *et al.* 2014).

An important constituent of decision making skills is the correct estimation of knowledge and skills (Kahneman 2011, Bruine de Bruin *et al.* 2007, Costa *et al.* 2017). Empirical research illustrates that the self-confidence trait is indeed different from the actual ability factor in the case of financial literacy (Gamble *et al.* 2014, Agnew & Szykman 2005, Johnson & Fowler 2011, Stankov & Crawford 1996). In general, people are overconfident. In fact, in the field of decision bias research, overconfidence is considered the most prevalent and damaging among the observed decisional biases (Baron 2000, Lichtenstein *et al.* 1981, West & Stanovich 1997). Unfortunately, only a handful of studies have examined the consequences of getting older in confidence calibration and its effects (Strough *et al.* 2011). Still, the results are remarkably heterogeneous. More accurate metaknowledge among older adults was observed by some studies (Forbes 2005, Kavé & Halamish 2015). On the other hand, studies also observed greater overconfidence in financial decision making skills among older adults (Finke *et al.* 2016, Gamble *et al.* 2014). Studies argued that is why elderly adults do not ask for help when their financial decision skills decline (Anderson *et al.* 2016, Gamble *et al.* 2014).

Still, in the field of financial behavior, recent results show that the self-assessed domain knowledge positively influences the saving behavior for retirement (Cokely *et al.* 2018, Anderson *et al.* 2016, Chen *et al.* 2018, Parker *et al.* 2012, Hadar *et al.* 2013). Therefore, we think that the term overconfidence should be dismantled to get a clear picture of its effect. The phrase overconfidence

is typically used and assessed as a trait-like, unified construct, even though the psychology literature recently started distinguishing its three forms affecting the behavior at different times and ways (Moore & Schatz 2017). The first form of overconfidence, overestimation, is believing that someone is better than reality justifies. In general, people tend to overestimate the outcome of complex tasks while underestimating their performance in very easy ones (Lichtenstein & Fischhoff 1977). According to motivational theories, such as the Theory of Planned Behaviour (Ajzen 2002, Fishbein & Ajzen 2011), behavior and behavioral intention are partially guided by beliefs on skills and abilities that may support or hamper the expected performance. The second and the most common form of overconfidence, overplacement, is the distorted belief that someone is better than others (Chamorro-Premuzic 2013). According to social comparison theories, comparing ourselves to others may reduce the uncertainties linked to knowledge and skill calibration (Festinger 1954, Goethals *et al.* 1991, Neff 2011). The third form of overconfidence, overprecision, manifests itself in the excess sureness that someone knows the truth. In this study, we concentrate on overplacement and overestimation as those two forms of overconfidence represent levels of knowledge beliefs. Also, recent studies suggest that the diverse forms of overconfidence may be domain-dependent (Muthukrishna *et al.* 2018). Nevertheless, we found only two studies measuring at least one form of overconfidence based on the belief distribution of financial literacy scores (Anderson *et al.* 2016, Pikulina *et al.* 2017).

In sum, so far, studies failed to explain fully how financial literacy, decision making skills and the diverse forms of financial literacy overconfidence interact with each other to explain households' actual and perceived financial well-being. Also, the cognitive/metacognitive changes coupled with aging justify the examination of the elderly population separately. Based on the literature review, we argue that financial literacy and decision making skills associate with the objective financial situation of households. Additionally, based on motivational theories, the level of perceived financial literacy is hypothesized to be a better predictor of financial situation than objective financial literacy. Besides, studies suggest that overconfidence may be responsible for not asking for financial advice and not seeking help when actual financial literacy is low. However, none of the studies examined overplacement separately, by comparing the belief distribution of own and other's financial literacy. We argue that the false belief of being better than

others may result in reluctance to accept help and be negatively linked to financial situation. Additionally, we hypothesize that households' financial situation directly influences perceived financial wellbeing. Therefore, we formulate the following four hypotheses:

H1: Financial literacy, overplacement, overestimation and decision making skills all affect households' financial situation.

H2: Overestimation is positively linked to financial well-being. Therefore, perceived knowledge is a better predictor of households' financial situation than actual financial literacy skills.

H3: Overplacement is negatively linked to households' financial situation.

H4: Financial situation is directly associated with perceived financial well-being.

MATERIALS AND METHODS

In the framework of a larger assessment on subjective well-being and its antecedents at retirement, three hundred retired people between the age of 65 and 85 filled out a questionnaire (Appendix A.) in their home in Hungary in March 2019 (see details on the questionnaire under 2.1 Data and applied variables). After deleting test-takers with missing data, the results of 267 respondents were analyzed for this study. Random sampling was applied to choose respondent in a way to represent the regional, settlement-type, age, and gender composition of the retired population in Hungary. Respondents were informed about the aim of the data collection, that participating in the study is voluntary and they can skip any question. Respondents' oral consent was obtained and no incentives were offered for the participation.

Data and applied variables *Decision making skill (DMS)*

Researchers argue that statistical numeracy predicts decision making skill better than fluid and crystallized intelligence because it simultaneously assesses mathematical competency, metacognition, deliberation, affective numerical intuition, intuitive understanding and self-regulated learning (Cokely *et al.* 2018, Sinayev & Peters 2015). We evaluated subjects' decision making ability by the three-minute-long version of the Berlin Numeracy Test (Cokely *et al.* 2012). Because in general, the results were very low, by a median split, we divided participants into two groups (Table A.1).

Financial literacy (FL)

Our financial literacy test consisted of 8 questions adapted from the Health and Retirement Study (Finke *et al.* 2016) or the study of Pikulina *et al.* 2017. The questions concerned different aspects of financial literacy skills, such as compound interest, money illusion, inflation, investment risk assessment and diversification, long period returns, and interest rates. Participants' financial literacy score is equal to the sum of the correct answers.

Overestimation (OE) and overplacement (OP)

Overestimation and overplacement were evaluated as suggested by Prims and Moore, 2017. Thus, the full Subjective Probability Interval Estimates (SPIES) distribution of own estimated scores and the estimated scores of a randomly chosen other respondent were elicited. Subjects were asked to sum up their probability distribution to 100. The answers were proportionally adjusted to 100 if the sum was a different amount. Based on the SPIES, we computed the expected value of own performance and the expected value of the randomly chosen other. Overestimation was calculated as the difference between the expected value of own performance and the actual performance on the financial literacy test. Overplacement was assessed as the difference between the perceived FL and the estimated performance of the randomly chosen other adjusted by the actual overachievement of the given respondent. As empirical results suggest that knowledge and task difficulty influence overconfidence, an expert group of four researchers divided the literacy questions into two categories: easy (questions 1-4) and hard (questions 5-8). SPIES were elicited on those two sets of questions separately.

Financial situation

Objective financial situation was assessed in a yes/no (No=2; Yes=1) format by two questions on the ability to cover unexpected expenses "Would you be able to cover an unexpected expense of 50 000?" (F1) and "Would you be able to cover an unexpected expense of 300 000 EUR?" (F2).

PERCEIVED FINANCIAL WELL-BEING (PFWB)

Our perceived financial well-being score was developed based on Netemeyer *et al.*, 2017. It consisted of three 11 point Likert scale questions -(1) "I am good at mathematics"; (2) "I am good at managing money"; (3) "I have enough savings"- and a five-point subjective income perception question ranging from "My income allows me a very comfortable life" to "I have difficulties in financing everyday expenses". After reversing and weighing the last scale by 1.25, the four PFWB scores were summed up to create our measure (Cronbach's Alpha=0.591).

RESULTS

First, we tested if overestimation and overplacement scores in the different conditions comply with the tendencies suggested by the literature review. The differences between participants' results in the different conditions were mostly tested by paired samples t-tests. Second, the connections between the predecessors of finances –overconfidence measures, decision making skills and financial literacy- were tested. Finally, a binary logistic regression with forwarding conditional entry was used to test the effect of the hypothesized predecessors of financial situation and linear regression modeling with stepwise entry method was employed to investigate our hypotheses on PFWB. Whenever a model contained several scale variables, z scores were calculated. Gender (binary code: Male=1; Female =2), educational attainment (binary code: below high school=1; high school and above=2) and subjective health condition (0-10 Likert scale) were entered as covariables in all the regression models. Table 1 contains the descriptive statistics of the variables used in the analyses.

Table 1. Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
PFWB	6.000	39.000	22.391	6.933
DMS	0.000	5.000	1.570	1.156
FL total	0.000	8.000	4.240	1.786
FL easy	0.000	4.000	2.450	1.242
FL hard	0.000	4.000	1.790	0.985
PFL easy	0.000	4.000	2.558	0.783
PFL hard	0.000	4.000	2.483	0.869
PFL total	0.800	8.000	5.042	1.468
OE easy	-3.000	3.000	0.109	1.138
OE hard	-2.000	3.000	0.693	0.992
OP easy	-2.623	4.377	0.254	1.321
OP hard	-3.263	2.737	0.181	1.094

Source: own calculation

A paired samples t-test indicated that subjects performed significantly higher on the financial literacy test ($t(266)=7.956, p<0.001$) in the easy than in the hard condition. With 21% giving a perfect estimate of their performance in the easy condition, test-takers estimated their knowledge well ($t(266)=-1.560, p>0.1$). Contrarily, subjects overestimated their knowledge in the case of hard financial literacy questions ($t(266)=-11.419, p<0.001$). As a consequence, respondents overestimated their overall financial knowledge but overestimation was more important in the hard than in the easy condition ($t(266)=-6.475, p<0.001$). Overestimation was also more typical among subjects (McNemar-Bowker Test= 26.257, $p<0.001$) in the hard condition. Additionally, subjects predicted their own performance better than the performance of their counterparts ($t(266)=-3.695, p<0.001$). On the average, the magnitude of overplacement was statistically equal in both conditions ($t(266)=0.778, p>0.1$). However, overplacement was more typical among the subjects in the easy condition (Cochran's Chi-Squared (1) = 4.101, $p<0.05$). Thus, the results are in line with the outcomes of studies on overestimation, overplacement and their relationships with knowledge and task difficulty. Moreover, according to our results, financial literacy and decision making skills

influence overestimation of financial literacy score both in the easy (M1 F (2, 264) =238.733 $p<0.001, R^2=0.644$) and hard conditions (M2 F (4, 262) =93.248 $p<0.001, R^2=0.414$). The results showing that decision making skills positively relate to overestimation back the idea that overestimation may be useful (Table 2). More knowledge was associated with less overplacement in the easy (M4 F (2, 264) =291.087 $p<0.001, R^2=0.688$) and hard conditions (M5 F (2, 264) =123.435 $p<0.001, R^2=0.483$). Decision making skills and financial literacy are both negatively associated overplacement (M6 F (2, 264) =8.131 $p<0.001, R^2=0.058$ (Table 3).

Table 2. Parameter estimates of the models on OE

DV	IV	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
M1 OE hard	(Constant)	1.657	0.103		16.120	0.000
	FL hard	-0.638	0.048	-0.634	-13.381	0.000
	DMS	0.388	0.094	0.195	4.124	0.000
M2 OE easy	(Constant)	1.795	0.094		19.034	0.000
	FL easy	-0.758	0.035	-0.827	-21.821	0.000
	DMS	0.370	0.086	0.162	4.286	0.000
M3 Abs OE total	(Constant)	2.268	0.162		14.015	0.000
	DMS	0.028	0.128	0.013	0.222	0.824
	FL total	-0.217	0.036	-0.359	-6.071	0.000

Source: own calculation

Table 3. Parameter estimates of the models on OP

DV	IV	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
M4 OP easy	(Constant)	2.372	0.102		23.160	0.000
	DMS	0.169	0.094	0.064	1.804	0.072
	FL easy	-0.897	0.038	-0.843	-23.761	0.000
M5 OP hard	(Constant)	1.509	0.106		14.182	0.000
	DMS	0.131	0.097	0.060	1.342	0.181
	FL hard	-0.776	0.049	-0.699	-15.709	0.000
M6 Abs OP total	(Constant)	2.166	0.174		12.451	0.000
	FL total	-0.320	0.137	-0.143	-2.326	0.021
	DMS	-0.103	0.038	-0.164	-2.672	0.008

Source: own calculation

Financial situation was assessed by two questions on the ability to cover unexpected expenses of 50 000 HUF (F1) and 300 000 HUF (F2). Of all test-takers, 67.8% declared that they could afford unexpected expenses of 50 000 HUF, while only 30% affirmed the feasibility of covering 300 000 EUR unexpected expenses. First, we regressed F1 on FL, the diverse overconfidence scores and decision making skill. Our model was highly significant, explaining about 21% of the variations of the answer (M7 Chi-square

(4) =44.129, $p < 0.001$, Nagelkerke $R^2 = 0.213$). Men and healthier individuals with higher financial literacy and overestimation are more likely to experience financial health according to our measure. Results were akin with F2 (M8 Chi-square (4) =33.032, $p < 0.001$, Nagelkerke $R^2 = 0.165$). In that model, the same predictors were significant (Table 4). As both the financial literacy score and its overestimation were significant predictors in both of the cases (F1 and F2), we have tested a model with

the PFL scores. According to our results, perceived financial knowledge is a better predictor of financial situation than actual knowledge (M9 F1: Chi-square (5) =50.278, $p < 0.001$, Nagelkerke $R^2 = 0.240$ and M10 F2: Chi-square (4) =31.672, $p < 0.001$, Nagelkerke $R^2 = 0.159$). Moreover, according to M9, overplacement – falsely believing that one is better than others – may harm households' financial situation (Table 4). As a consequence, H1, H2, and H3 are approved. To investigate what individ-

ual differences play a role in PFWB, we regressed PFWB on financial situation and its predecessors (Table 5). Linear regression showed that F1, subjective health and decision making skills together explain about 36% of changes in subjective financial well-being (M11 F (3, 263) =50.942 $p < 0.001$, $R^2 = 0.367$). We got comparable results with F2 (M 12 F (4, 262) =42.820 $p < 0.001$, $R^2 = 0.395$). Hence, H4 is approved.

Table 4. Parameter estimates of the models on F1 and F2

DV	IV	B	S.E.	Wald	df	Sig.	Exp(B)
M7 F1	Gender	0.644	0.297	4.712	1	0.030	1.904
	Health	-0.470	0.147	10.240	1	0.001	0.625
	FL	-0.880	0.199	19.626	1	0.000	0.415
	OE total	-0.439	0.189	5.385	1	0.020	0.645
	Constant	-1.900	0.506	14.076	1	0.000	0.150
M8 F2	Gender	0.653	0.289	5.087	1	0.024	1.920
	Health	-0.513	0.155	11.007	1	0.001	0.599
	FL	-0.671	0.193	12.051	1	0.001	0.511
	OE total	-0.407	0.185	4.804	1	0.028	0.666
	Constant	-0.042	0.461	0.008	1	0.928	0.959
M9 F1	Gender	0.724	0.305	5.648	1	0.017	2.062
	OP total	0.401	0.152	6.911	1	0.009	1.493
	Health	-0.357	0.153	5.420	1	0.020	0.700
	School	-0.622	0.312	3.986	1	0.046	0.537
	PFL	-0.582	0.156	13.986	1	0.000	0.559
	Constant	-1.136	0.638	3.168	1	0.075	0.321
M10 F2	Gender	0.670	0.288	5.395	1	0.020	1.954
	Heath	-0.508	0.153	10.984	1	0.001	0.602
	PFL	-0.495	0.150	10.919	1	0.001	0.609
	Constant	-0.076	0.458	0.028	1	0.868	0.926

Source: own calculation

Table 5. Parameter estimates of the models on PFWB

DV	IV	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
M11 PFWB	(Constant)	28.784	1.127		25.531	0.000
	F1	-5.742	0.752	-0.388	-7.639	0.000
	Zscore Health	2.064	0.353	0.298	5.842	0.000
	DMS	2.603	0.694	0.188	3.751	0.000
M12 PFWB	(Constant)	31.337	1.381		22.696	0.000
	F2	-5.889	0.757	-0.390	-7.777	0.000
	Zscore Health	2.011	0.346	0.290	5.811	0.000
	DMS	2.318	0.699	0.167	3.317	0.001
	Zscore PFL hard	0.779	0.352	0.112	2.211	0.028

Source: own calculation

DISCUSSION AND CONCLUSION

In sum, based on our results, it seems that decision making skills, overestimation, overplacement and financial literacy all play a crucial role in the financial situation of elderly adults. Consistent with our expectations, perceived financial literacy associates with financial situation more closely than actual financial literacy skills. This result is in line with recent studies showing that perceived financial literacy is more important to predict positive financial behavior than actual financial literacy skills. However, as the number of questions on financial literacy naturally bounded how overconfident someone could be, one should be careful with the interpretation of these results. Overconfidence may be useful until a certain point (see e.g. Pikulina *et al.* 2017). Future research should address this issue. Additionally, the results imply that overplacement may harm households' financial situation. Until now, financial literacy overplacement was not separately examined in the literature, but we think that its negative effect on financial situation may be due to the reluctance of asking for help in financial decision making. Help seeking behaviour was studied and linked to general overconfidence by research. Besides, actual financial situation was found to be the most important antecedent of perceived financial well-being.

Financial literacy has been in the focal point of policymakers for a while, particularly since the financial crises. Our outcomes reinforce that it is indeed worth promoting programs helping elderly people acquiring domain-specific financial knowledge. These programs may lead to better financial situation and higher self-efficacy. Besides, general decision making skills are also important aspects of financial decision making. Thus, our findings imply that it would be worthwhile to concentrate on the calibration of financial knowledge too. For researchers, our results show that it is necessary to calculate with decision making skills and analyse the effects of the forms of overconfidence separately when looking for possible causes behind low financial well-being. Finally, we have to mention the limitations of our study. Our analyses concern only people aged between 65 and 85, but changes in the metacognitive and cognitive processes suggest that the findings may not be fully generalizable. It would be interesting to investigate younger adults as well. In addition, this is a descriptive study. Based on our analyses, we can talk only about associations and not causations. Better life outcomes may cause higher overestimation for example. Future studies should concentrate on how the action, motivation, confidence circle unfolds. Also, respondents were not compensated to participate in this study. The very low result on the berlin numeracy test -the questionnaire that required the most deliberation- reflects the lack of motivation. In sum, the purpose of this research was to map how the interactions

between financial literacy, decision making skills and the different forms of overconfidence shape households' financial situation and well-being at retirement. Thus, this study contributes to understand what skills and knowledge underwrite financial well-being at retirement.

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APPENDIX A.

Financial Literacy Questionnaire

1. Suppose you had 10,000 HUF in a savings account and the interest rate was 20% per year. After five years, how much do you think you would have in the account if you left the money to grow? 1. More than 20,000 HUF 2. Exactly 20,000 HUF 3. Less than 20,000 HUF
2. Ana has three credit cards (A, B and C) and she owes 100,000 HUF on each of them. The interest rates are 7% for card A, 9% for card B, and 8% for card C. If Ana has 200,000 HUF to pay off her debt, which cards should she pay if she wanted to minimize future interest payments? 100,000 HUF to card B and 100,000 HUF to card C 2. 66,600 HUF to card A, 66,800 HUF to card B and 66,600 HUF to card C 3. 100,000 HUF to card A and 100,000 HUF to card C
3. Imagine that the interest rate on your savings account was 1% per year and the inflation was 2% per year. After one year, how much would you be able to buy with the money in this account? 1. More than today 2. Exactly the same as today 3. Less than today
4. Suppose that next year, your income will double but the prices also double. How much do you get for your salary? 1. More than today 2. Same as today 3. Less than today
5. Comparing to buying a single company stock, if an investor buys stocks from several companies, the risk associated with the investment 1. Grows 2. Decreases 3. Stays the same
6. If the interest rate falls, what happens to the bond prices? 1. Rise 2. Decrease 3. Stay the same
7. Which asset do you think pays the highest returns over a long time period, say 10-20 years or more? 1. Saving accounts 2. Bonds 3. Stocks
8. Shares or bonds are riskier? 1. Shares 2. Bonds 3. Both are equally risky