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Do U.S. households perceive their retirement preparedness realistically?

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Abstract

This study examines the divergence between objective and subjective assessment of retirement adequacy, analyzing U.S. households with a full-time worker age 35 to 60 in the 2010 Survey of Consumer Finances. Of those households, 58% have objective inadequacy, and 54% have subjective inadequacy, but only 52% have objective/subjective consistency. Our focus is on households with objective inadequacy, and what factors were related to being an optimist despite having objective retirement inadequacy. A logistic regression shows that households with defined benefit plans and with defined contribution plans are less realistic than those without plans, and as age increases, realism decreases.

Jel classification: D12; D14; D91; J26

Keywords: Retirement assessment; Retirement adequacy; Cognitive ability; Survey of Consumer Finances (SCF); Financial education

1. Introduction

Retirement adequacy of current workers is an important issue in policy debates about Social Security reform, and in proposals for the restructuring of public and private defined benefit plans, as well as for income tax incentives for retirement savings, and penalties for early withdrawal of funds from tax-sheltered retirement accounts. However, retirement planning is becoming increasingly challenging because workers face economic uncertainty,

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Table 1 Perception vs. objective retirement adequacy of U.S households with head employed full-time and age 35 to 60, 2010 SCF

	Objective measurement[b]		Total
	Adequate retirement	Inadequate retirement	
Subjective measurement[a]			
Perceived adequate retirement	19.6% (adequate realists)	26.1% (unrealistic optimists)	45.7%
Perceived inadequate retirement	22.3% (pessimists)	32.0% (inadequate realists)	54.3%
Total	41.9%	58.1%	100%

[a] For the purpose of this study, we recoded the perceived retirement adequacy variable as a binary category. When the response is coded 1 or 2 (totally inadequate and inadequate), it is defined as having a perception of an inadequate retirement. If the response has 3, 4, or 5, perceived adequacy coded as having a perception of an adequate retirement.

[b] See the Method section.

Social Security insolvency, and increased life expectancy. Munnell (2012) notes that the substantial decline in the wealth-to-income ratio in the 2010 Survey of Consumer Finances (SCF) is a signal of even more serious economic problems for future retirees. Bricker, Bucks, Kennickell, Mach, and Moore (2011) report that over 60% of U.S. households had decreases in their wealth over the two-year period, 2007–2009. According to the 2014 Old-Age and Survivors Insurance and Federal Disability Insurance Trustees Report (Social Security Administration, 2014), if no changes in taxes or benefits are implemented, the combined Trust Fund would be depleted by 2033, and income would be sufficient in the combined fund to pay only 77% of scheduled benefits.

Choi, Laibson, and Madrian (2004) note that defined benefit pension plans have been steadily being replaced with defined-contribution pension plans so that workers are more responsible for their own retirement savings. Therefore, it is important that workers have accurate assessments of their financial status in the retirement planning process. Comparing objective assessments of projected retirement adequacy to individual assessments of future retirement adequacy would provide insights into potential problems. Analysis of factors related to discrepancies between objective and subjective assessments could provide a better focus for financial education.

The main purpose of this study is to assess the consistency between objective and subjective projected retirement adequacy. To assess the objective retirement adequacy, we calculate the mean income replacement rate by following the retirement income stage method (Chen, 2007; Kim, Hanna, and Chen, 2014). Compared to the benchmark ratios for different income categories estimated from the 2010 Consumer Expenditure Survey, the adequacy of retirement resources is determined. The SCF variable of the respondent's perception of the adequacy of retirement income is used as a subjective measure of having an adequate retirement. Based on objective/subjective consistency, we identify four groups; Unrealistic Optimists, Pessimists, Adequate Realists, and Inadequate Realists (Table 1). We focus our analysis in this article on households that are projected to have objective inadequacy (i.e., Unrealistic Optimists & Inadequate Realists) for the purpose of public policy interests. By analyzing households aged 35 to 60 with a full-time worker in the 2010 Survey

of Consumer Finances (SCF) dataset, we analyze factors related to being an unrealistic optimist among households with objective inadequacy.

2. Literature review

2.1. Behavioral versus the life cycle model

The dominant theory for analyzing retirement saving behaviors is the Life Cycle Saving (LCS) model (Modigliani and Brumberg, 1954). The LCS model (Ando and Modigliani, 1963) assumes that attempt to smooth consumption, and therefore, typically savings will be related to an individual's stage in the life cycle. Those who use the LCS model to explain household behavior are assuming that households can make rational decisions and can project future patterns of non-investment income and life expectancy. Furthermore, the LCS model has the assumption that consumption smoothing can be achieved by borrowing when earnings are low and saving for wealth accumulation when earnings are high, and dissaving in retirement (Browning and Crossley, 2001). In the traditional approach, households are assumed to be fully informed about their life-cycle wealth and when they will retire.

On the other hand, behavioral economists are interested in how people make decisions in the face of incomplete information, limited cognitive resources, and decision biases (Knoll, 2010). The behavioral life-cycle hypothesis integrates a traditional LCS model with a psychological model including saving motives (Shefrin and Thaler, 1988), the buffer stock saving model (Carroll, 1997), and the hyperbolic consumption model (Angeletos, Laibson, Repetto, Tobacman, and Weinberg, 2001; Laibson, 1997). Because this study focuses on the divergence between a household's objective and subjective assessment of retirement resources and its adequacy, we review some empirical studies that have been discussed to analyze the effect of cognitive ability on financial behavior related to households' retirement saving (or planning).

2.2. Cognitive ability and economic decisions

Previous studies have focused on the relationship between cognitive ability and economic decisions. Frederick (2005) and Dohmen, Falk, Huffman, and Sunde (2010) discuss cognitive ability and its relation with two important decision-making characteristics: time preference and risk preference. Frederick (2005) uses the Cognitive Reflection Test (CRT) score as a proxy of the individual's cognitive ability, and finds that among 3,428 respondents at various universities, the higher CRT group was more patient and willing to take more risks than those who scored lower. Similarly, Dohmen et al., (2010) examines whether an individual's cognitive ability is related to the key traits of time preference and risk aversion. From the German Socio-Economic Panel (SOEP) dataset, individuals with a lower cognitive ability are significantly more impatient and more risk averse. Moreover, recent studies find that cognitive ability plays an important role in investment portfolio choices and stock ownership (Christelis, Jappelli, and Padula, 2010; Grinblatt, Keloharju, and Linnainmaa,

2011), wealth accumulation (McArdle, Smith, and Willis, 2011), and avoiding financial mistakes (Agarwal and Mazumder, 2013).

2.3. Self-assessment and perception of retirement

The role of cognitive ability on subjective assessment of retirement preparedness has received little attention in previous retirement research, even though it may affect retirement decisions, including how individuals behave when deciding if, how, and when to save for retirement. With the replacement of traditional defined benefit (DB) pension plans with defined contribution (DC) plans, an accurate assessment of retirement resources is becoming more vital in retirement planning. Gustman, Steinmeier, and Tabatabai (2007) report that more than a third of Health and Retirement Study (HRS) respondents cannot identify whether their pension plan is a DB or a DC plan. Similarly, Chan and Stevens (2008) find that many respondents in the HRS with DB or DC pension plan do not know key components of their pension plan, such as normal or early age for DB plans and annual contribution amount for DC plans, and there is substantial discrepancy of pension details between self-reported and employer reported data.

Lusardi and Mitchell (2011) conclude that lack of financial literacy and financial sophistication are critical in retirement planning, and Fornero and Monticone (2011) find that more financially knowledgeable people are more likely to participate in retirement plans. Cummings, Finke, and James (2011) report that respondents with higher cognitive ability are more likely to own a Roth IRA and adopt it early.

In addition to assessing how workers are currently preparing for retirement, it is also essential to investigate how they perceive their retirement preparedness. Glamser (1976), and Kilty and Behling (1985) find a positive link between perceptions of retirement and actual retirement planning. Joo and Grable (2001) report that workers with positive and proactive attitudes toward retirement are more likely to use retirement planning advice from a financial professional. However, relatively little research on the impact of retirement perception on retirement adequacy has been conducted. Malroutu and Xiao (1995) examine pre-retirees' (age 65 or younger) perception of having adequate retirement income by using the 1989 SCF. About 39% of pre-retirees answer that they would have adequate retirement income. Younger respondents, females, Whites, households with relatively low incomes and self-employed are less likely to perceive having adequate retirement income.

Munnell, Golub-Sass, Soto, and Webb (2008) investigate the accuracy of self-assessment about retirement security. The National Retirement Risk Index (NRRI) provides an objective measurement of retirement security, which is the percentage of households are at risk of being unable to maintain their standard of living in retirement. In the 2004 Survey of Consumer Finances, about 60% of households have a good sense of their retirement security. Munnell et al. (2008) focus on households whose self-assessment is inconsistent with the NRRI. Households owning a home, having college degree, unwilling to take risk and those with one-earner have higher probabilities of being in the "too worried" group compared with being appropriately worried. Renters, those with less than a college education, those lacking a defined benefit plan, those with poor health and those willing to take some risk are more

likely to be in the "not worried enough" group compared with being appropriately not worried.

2.4. Retirement adequacy

Hanna and Chen (2008) report that previous research studies on the projected retirement adequacy of working households have produced a wide range of estimates, from 31% to 80% having an adequate retirement. However, studies using the Survey of Consumer Finances (SCF) have a narrower range of estimates. Yuh, Hanna, and Montalto (1998) conclude that about 52% of households in 1995 would have enough assets and income for retirement assuming investment assets earn historical mean returns, but, based on pessimistic projection of investment returns, only 42% would have adequacy. Yuh (2011) reports that 56% of pre-retired households in 2004 would be able to maintain 70% of permanent income in retirement. Kim and Hanna (2013) find that about 42% of working households in the 2010 SCF are adequately prepared for retirement, based on mean projection of investment returns.

3. Methodology

3.1. Data and sample selection

We use the 2010 Survey of Consumer Finances (SCF) dataset, a cross-sectional dataset sponsored by the Federal Reserve Board. The SCF provides comprehensive and detailed information on the financial status of U.S. households (Bricker, Kennickell, Moore, and Sabelhaus, 2012). Our initial analytic sample is composed of households with a head who is age 35 to 60 and currently working full-time. Some previous studies, for example, Yuh et al. (1998), Montalto, Yuh, and Hanna (2000), and Chen (2007), use a sample of employed household heads age 35 to 70, but because many workers retire between 60 and 70 we use a different age criteria, to reduce possible selection bias. We assume that retirement age is exogenous, as is assumed by Scholz, Seshadri, and Khitatrakun (2006) and Brown, Fang, and Gomes (2012). For calculation of retirement adequacy, for workers who answer a question about the expected age for retirement from full-time work with "never retire," we assume an expected retirement age of 70. There are 6,482 households in the public release of the 2010 SCF dataset, and 2,283 of the households meet our sample criteria. This study mainly focuses on households that are projected to have objective inadequacy, therefore, for our multivariate analysis we exclude households with objective adequacy, and the final sample size is 1,203.

3.2. The dependent variable

3.2.1. Objective measurement–projection for retirement adequacy

In this study, retirement resources include Social Security benefits, projected defined benefit (DB) pensions, projected part-time wages after retirement, and annuity distributions from projected retirement assets of the household head and any spouse/partner. Our calculation of resources during retirement follows the retirement income stage method reported by

Chen (2007) and Kim et al. (2014). The projected retirement needs are based on estimates of each household's expenditures, using mean expenditure to pretax income ratios for different income ranges (Palmer, 1992, 1994), so high income households have a lower replacement ratio than low income households because of higher proportions of pretax income going for income taxes and saving.

The replacement ratio is equal to the projected retirement income divided by estimated preretirement expenditures. We estimate benchmark replacement ratios derived from the 2010 Consumer Expenditure Survey published by the Bureau of Labor Statistics (U. S. Department of Labor, 2012). We use the normal household income of the household, and in the corresponding published income category in the BLS, we set the benchmark ratio as the ratio of average annual expenditure divided by average pretax income in that BLS category. For example, a household with a normal income of $45,000 would be assumed to have expenditures equal to 91% of pretax income, whereas a household with a normal income of $100,000 would be assumed to have expenditures equal to 69% of pretax income. Our approach to defining objective retirement expense needs is more sophisticated than many previous studies, but it does not take into account the heterogeneity of households with the same income level, for instance, as discussed from a normative life cycle approach by Scholz et al. (2006).

The projected retirement income includes annual withdrawals from projected accumulated retirement assets with mean returns (cf., Yuh et al., 1998), and other retirement income including Social Security benefits, defined benefit pensions, and part-time wages. If the projected retirement replacement ratio is equal to or greater than the benchmark replacement ratio, this household would have adequate retirement resources to sustain retirement needs.

3.2.2. Subjective measurement–perception of retirement adequacy

The SCF has a variable for the respondent's perception of the adequacy of retirement income, with five levels–totally inadequate (coded as 1), inadequate (coded as 2), enough to maintain living standards (coded as 3), satisfactory (coded as 4), and very satisfactory (coded as 5). Though few studies have focused on the retirement perception variable in the SCF survey, it plausibly reflects the respondent's perception of having an adequate retirement. For the purpose of this study, the subjective measurement is a dichotomous indicator of households' perception of having an adequate retirement with value equal to 1 if the value of indicator is 3, 4, or 5 (adequate), otherwise the value is 0 (inadequate).

3.2.3. Categories for the dependent variable

Our initial analysis is based on all households with a head employed full-time and age 35 to 60. Based on objective/subjective consistency, we define four categories of objective/perceived retirement adequacy: realists having adequate resources (Adequate Realists), realists having inadequate resources (Inadequate Realists), households having only subjective adequacy (Unrealistic Optimists), and households having only objective adequacy (Pessimists). Given the importance of households with projected objective retirement inadequacy, we then focus only on households with projected inadequate retirement resources. We create a binary variable for objectively inadequate households for descriptive and multivariate analysis (Unrealistic Optimists vs. Inadequate Realists).

Table 1 indicates the proportion of U.S. households in four categories of objective/perceived retirement adequacy. Only 42% of working households are adequately prepared for retirement based on an objective measure, whereas 46% rate their future retirement income adequate. There are various possible explanations for the low proportion of working households having objective adequacy, including hyperbolic discounting (Angeletos et al., 2001; Laibson, 1997) and simple mistakes (Campbell, 2006). It is also possible that our assumptions about household preferences and expectations are not accurate, though we make assumptions similar to those made by most authors analyzing retirement adequacy. We return to this issue in our conclusions.

The proportion of households rating their future retirement income as adequate is similar to the proportion of households with objective inadequacy, but only 52% of households have consistency between subjective and objective adequacy. About 20% of households are Adequate Realists and have both subjective and objective adequacy. Pessimists (objective adequacy but subjective inadequacy) comprise 22% of households, while 26% are Unrealistic Optimists (subjective adequacy but objective inadequacy). About 32% of households are Inadequate Realists and have inadequacy consistently between the two retirement adequacy measurements.

3.3. Independent variables

Presumably a worker's ability to accurately assess retirement adequacy depends on cognitive ability and experience. The SCF does not include a direct measure of cognitive ability, but Kyrychenko and Shum (2009) and Stango and Zinman (2009) use education as a proxy for financial cognition or sophistication. Lusardi and Mitchell (2007) find that the level of formal education is related to measures of financial literacy. We measure educational attainment by five dummy variables: Less than high school, high school graduate, some college, bachelor degree, and post-bachelor degree. For multivariate analysis, we use a continuous variable, years of education of the head. Huston, Finke, and Smith (2012) propose that the interviewer's assessment of how well the respondent understands the SCF survey questions is a proxy for financial sophistication, because it is related to the respondent's understanding of personal finance. Kim and Hanna (2013) use this variable in a retirement adequacy study. The variable has four levels of understanding of SCF questions: excellent, good, fair, and poor. For the purpose of this study, we code it as a binary variable because of the distribution of responses; it is coded as good understanding if the assessment is excellent or good, and as poor understanding if the response is fair or poor understanding of the SCF survey. We also include use of a financial planner for saving and investment decision as a proxy for the ability to judge retirement adequacy. Use of a financial planner is not necessarily a substitute for financial literacy (Collins, 2012), and Hanna (2011) reports that controlling for other factors, use of a financial planner increases with education. It is possible that a financial planner might give a client a false sense of confidence (e.g., Cordell, Smith, and Terry, 2011). In the SCF measure, it is not possible to identify the qualifications of financial planners that respondents report using. However, it is plausible that use of a financial planner should tend to improve a worker's ability to judge retirement adequacy.

Some demographic variables may be related to the experience of the household, and

therefore might be plausibly related to the ability to judge retirement adequacy. Presumably as one ages, experience will lead to a better ability to judge retirement adequacy. However, fluid intelligence decreases with age among adults (McArdle et al., 2011, p. 213). Agarwal, Driscoll, Gabaix, and Laibson (2009) suggest that the combined effect of decreasing cognitive ability and increasing experience results in the incidence of financial mistakes decreasing until age 53, then increasing. For descriptive analyses, we categorize age of the household head into three categories: 35–44, 45–54, and 55–60. For multivariate analysis, we use age as a continuous variable. Of the four racial/ethnic groups identified in the SCF, White, Black, Hispanic, and Asian/other, it is plausible that Whites have the most experience in dealing with investments, and so forth (Hanna and Lindamood, 2008; Yao, Gutter, and Hanna, 2005). For the multivariate analysis, to obtain more robust estimates of effects, a binary variable of racial/ethnic group is created: White versus combination of other three race categories.

We include a number of other variables as controls. Marital status is measured by using four categories: married couple, female or male single household and partner. Employment status of household head is measured with binary variables: employed and self-employed. Economic status variables include normal income and retirement planning variables. To capture the possible nonlinearity of the relationship, household income is transformed into the natural log of normal income. Retirement variables consist of having a defined benefit pension, having a defined contribution pension, and expected retirement age. The expected retirement age includes four categories partly based on Social Security benefit rules: before 62, between 62 and 65, over 65, and "never retire." Financial attitude variables include spending behavior, saving for retirement, and the respondent's risk tolerance. The spending behavior includes three categories: reported spending is greater than income (deficit), spending is equal to income, and spending is less than income (surplus). Households who report retirement as a savings goal are coded saving for retirement. The level of risk tolerance is measured as four dummy variables for no risk, average, above average, and substantial risk.

3.4. Analysis

A logistic regression model is used to test the effect of our selected explanatory variables on the likelihood of being unrealistic optimists among households with inadequate resources. We use the Repeated-Imputation Inference (RII) method, which provides variance estimates more closely representing the true variances than estimates obtained by only one implicate (Lindamood, Hanna, and Bi, 2007). Means tests are used with the RII technique to examine differences of the projected retirement adequacy between households with different perception of retirement. Our multivariate analysis is unweighted (Lindamood et al., 2007).

3.5. Research hypotheses

Hypothesis 1: Cognitive ability is negatively related to the likelihood of being an unrealistic optimist.

The highest educational attainment of the household head and understanding of the SCF survey question are used as proxies to cognitive ability. Use of a financial planner for saving and investment decisions may supplement an individual's cognitive ability.

Hypothesis 2: Financial experience is negatively related to the likelihood of being an unrealistic optimist.

Financial experience variables include age of household head, race/ethnic identity, and having a defined benefit/contribution plan.

4. Results

4.1. Household characteristics of households with objective inadequacy

Table 2 shows patterns of selected household characteristics by two categories of objective/perceived retirement adequacy, for households with objective inadequacy (i.e., Unrealistic Optimist and Inadequate Realist). Those who have a college degree (43%) are less likely to be an Unrealistic Optimist than those with less than a high school degree (48%). Those who report using a financial planner for saving and investment decisions (49%) have a higher rate of being unrealistic than those who do not use a financial planner (44%). Households with a poor understanding of survey questions (52%) have higher proportion of being unrealistic than those with a good understanding (44%).

The rate of being unrealistic increases with the age of household head, with 41% of those age 35 to 44 unrealistically thinking they will have adequate retirement income, but 50% of those age 55 to 60 being unrealistic. Whites have a lower rate of being unrealistic than each of the other racial/ethnic groups. Because of the low number of Blacks, Hispanics, and Asian/others in the analytic sample and the similar rates of being unrealistic in each of those groups, in the multivariate analysis we combine the three groups. For the descriptive comparison, the combined group has a rate of being unrealistic of 48%, compared with 43% for Whites, and that difference is significant. For households having a DB plan, the rate of being unrealistic is higher than the rate for those without a DB plan (58% vs. 43%.) There is a similar pattern for having a DC plan, with the rate of being unrealistic 55% among those with a DC plan and 38% for those without one.

The proportion of being unrealistic is higher for married couples than for other groups. As the household head's expected retirement age increases, the rate of being unrealistic decreases, from 55% for those who expect to retire before 62 to 42% for those who expect to retire after 65, and the rate among those who expect to never retire is very low, only 26%. Households that spend less than or equal to income are more likely to be unrealistic than those who report spending more than income. Households that report having a saving objective related to retirement are more likely to be unrealistic than those who do not report having a retirement goal. As risk tolerance increases, the proportion of being unrealistic increases from 40% (no risk) to 52% (substantial risk). For the multivariate analysis, we

Table 2 Rate of unrealistic optimists by selected household characteristics, among households with head employed full-time and age 35 to 60, with objective retirement inadequacy 2010 SCF

Variable	Distribution, among households with objective inadequacy	% Unrealistic optimists	Significance level
Education of household head			
Less than high school	11.1	47.6	Reference
High school graduate	31.8	44.6	0.2093
Some college	18.3	47.6	0.9945
Bachelor degree	27.9	43.1	0.0597
Post-bachelor degree	10.9	42.8	0.0920
Use of financial planner			
Use	24.6	48.6	<.0001
Do not use	75.4	43.7	Reference
Understanding of the SCF survey question			
Good understanding	89.6	44.1	0.0006
Poor understanding	10.4	51.6	Reference
Age of household head			
35–44	40.3	40.5	Reference
45–54	42.1	47.1	<.0001
55–60	17.6	49.6	<.0001
Racial-ethnic category			
White	64.0	43.4	Reference
Black	14.7	47.9	0.0207
Hispanic	16.2	46.2	0.1309
Asian or others	5.0	50.5	0.0179
Combination of Black, Hispanic, Asian/other	36.0	47.5	0.0029
Defined benefit (DB) plan			
Have DB plan	12.5	58.2	<.001
Do not have DB plan	87.5	43.0	Reference
Defined contribution (DC) plan			
Have DC plan	43.2	54.6	<.0001
Do not have DC plan	56.8	37.5	Reference
Marital status			
Married	58.8	47.6	Reference
Single male	13.5	40.8	0.0006
Single female	21.9	42.2	0.0013
Partner	5.8	36.9	0.0002
Employment status			
Salary worker	91.4	46.5	Reference
Self-employment	8.6	27.6	<.0001
Expected retirement age of head			
Retirement age $<$ 62	25.2	55.3	Reference
62 $\leq$ Retirement age $\leq$ 65	37.3	49.3	0.0005
Retirement age $>$ 65	18.1	41.6	<.0001
Never retire	19.4	26.0	<.0001
Spending behavior			
Spending $<$ Income	50.2	50.2	<.0001
Spending $=$ Income	33.1	42.4	<.0001
Spending $>$ Income	16.7	34.1	Reference
Having retirement purpose			
Have	52.4	48.4	<.0001
Do not have	47.6	41.0	Reference

(continued on next page)

Table 2 *(continued)*

Variable	Distribution, among households with objective inadequacy	% Unrealistic optimists	Significance level
Risk tolerance			
No risk	43.5	40.2	Reference
Average risk	38.3	47.2	<.0001
Above average risk	15.5	51.0	<.0001
Substantial risk	2.7	52.0	0.0033
Combination of above average and substantial risk	18.2	51.1	<.0001

Restrictions are described in the Method section, and include head being 35 or older, but no more than 60 and being in the labor force. $N = 1{,}203$. Significance levels based on RII means tests.

combine the substantial and above average responses because of the very small number of substantial responses.

4.2. Multivariate analyses

Table 3 presents the logistic regression results of the likelihood of being an Unrealistic Optimist among those who are projected to have objective inadequacy. As years of education increase, the likelihood of being unrealistic decreases. The other variables assumed to be related to ability, the interviewer's perception of the respondent's understanding of the survey, and use of a financial planner for saving or investment decisions, are not significantly related to being unrealistic.

Most variables related to financial experience have effects contrary to expectations. Age of the household head is positively related to the likelihood of being unrealistic. Households with a defined benefit pension and those with a defined contribution plan are more likely to be unrealistic than similar households not having a defined benefit or a defined contribution plan. However, White respondents are less likely to be unrealistic than similar households in the other three racial/ethnic categories, so to the extent that Whites have more financial experience than those in the other categories, experience may be related to better assessment of retirement adequacy.

Households with a self-employed head are less likely to be unrealistic than those with a head working for a salary. Households who expect to retire after age 65 or to never retire are less likely to be unrealistic than those with an expected retirement age less than 62. Households who spend less than or equal to income are more likely to be unrealistic than those with a deficit. Lastly, households willing to take above-average or substantial risks are more likely to be unrealistic than those unwilling to take any risk.

5. Discussions and implications

The primary goal of this study is to analyze the deviation between a household's objective and subjective assessment of retirement adequacy. Four different types of households—Adequate Realists, Inadequate Realists, Unrealistic Optimists, and Pessimists—are catego-

Table 3 Logistic regression analysis of likelihood of being unrealistic optimists, of households with head employed full-time and age 35 to 60, and objective retirement inadequacy, 2010 SCF

Variable	Coefficient	Two-tail *p*-value[a]	Standard error	Odds ratio
Cognitive ability: Education of household head, use of financial planner, good understanding of the SCF survey question				
Education of household head (continuous variable)	−0.0681	0.0094	0.0263	0.934
Use of financial planner (reference category: No)	0.0962	0.5301	0.1525	1.101
Good understanding of the SCF survey question (reference category: No)	−0.2777	0.2045	0.2192	0.758
Financial experience: Age of household head, racial-ethnic status, having a retirement plan				
Age of household head (continuous variable)	0.0204	0.0307	0.0094	1.021
Racial-ethnic category (reference category: White)				
Combination of Black, Hispanic, and Asian/other	0.3648	0.0140	0.1488	1.440
Have defined benefit plan (reference category: No)	0.5289	0.0088	0.2025	1.697
Have defined contribution plan (reference category: No)	0.4976	0.0006	0.1445	1.645
Control variables: Marital status, self-employed, log of income, expected retirement age, spending behavior, have retirement purpose, risk tolerance				
Marital status (reference category: Married)				
Single male	−0.1838	0.3755	0.2072	0.832
Single female	0.0199	0.9081	0.1737	1.020
Partner	−0.1007	0.7171	0.2817	0.904
Self-employment (reference: Salary worker)	−0.5618	0.0102	0.2190	0.570
Log of income	−0.0164	0.8244	0.0730	0.984
Expected retirement age (reference category: Under 62)				
62 ≤ Retirement age ≤ 65	−0.2072	0.2347	0.1744	0.813
Retirement age > 65	−0.5484	0.0057	0.1981	0.578
Never retire	−0.9492	<.0001	0.2061	0.387
Spending behavior (reference category: Spending > Income)				
Spending = Income	0.4015	0.0461	0.2014	1.494
Spending < Income	0.6515	0.0006	0.1910	1.919
Have retirement purpose (reference: No)	0.046	0.7495	0.1443	1.047
Risk tolerance (reference category: Take no risk)				
Average risk	0.252	0.1082	0.1569	1.287
Combination of above-average and substantial risk	0.4357	0.0243	0.1938	1.546
Concordance (mean)	67.6%			

[a] Unweighted RII analysis of 2010 SCF dataset, analysis of 1,203 households with full-time employed head age 35–60, and with objective retirement inadequacy.

rized by objective/subjective retirement assessments. Only 42% have objective retirement adequacy, whereas 46% perceive they will have an adequate retirement. About 52% have a consistency between objective and subjective adequacy. For our multivariate analysis, we focus on the likelihood of being an Unrealistic Optimist among a sample of households with objective inadequacy.

Our descriptive results shown in Table 2 indicate among households with inadequate retirement resources, the households with a head with a college degree have lower rate of being unrealistic optimists than those with less than a high school degree. Those reporting use of a financial planner are significantly more likely to have to be unrealistic than those who do not use a financial planner, raising questions about the accuracy or benefit of financial

planning services. Those who have good understanding of the SCF survey question are less likely to be unrealistic than those who have a poor understanding, suggesting that cognitive ability does play a role in accurate assessment of retirement adequacy.

Among financial experience variables, age of the household head is positively associated with the likelihood of being unrealistically optimistic. It is possible that cognitive decline may play a role in this pattern, though given that Agarwal et al. (2009) suggest that the incidence of financial mistakes might decrease with age until about age 53, it seems unlikely that this could be the only factor related to this pattern. The effect of age on over-optimism might be related to the cognitive dissonance of some households. The theory of cognitive dissonance (Festinger, 1957) posits that individuals are distressed by conflicting cognitive elements. Morton (1993) suggests that individuals attempt to decrease their dissonance by either: (1) changing their past values, feelings, or opinions, or, (2) attempting to justify or rationalize their choices. In behavioral finance, financial cognitive dissonance is used in that individuals change their investment styles or beliefs to support their financial decisions (Ricciardi and Simon, 2000). With financial experience, people should be better able to evaluate objective situations, but cognitive dissonance may lead to accepting lower standard of living in retirement.

Another explanation might be that an individual's investment knowledge and skills change by age because of experience. Korniotis and Kumar (2011) find that older investors are more likely to have greater investment experience and knowledge while they may face adverse effects of cognitive aging on investment skills. Older investors would have more experience in stock market cycles and have more belief in the possibility of a stock market recovery by retirement, but younger investors, with more limited experience, might be pessimistic. For evaluation of retirement adequacy, experience and salience should increase with age, and cognitive ability probably plays less of a role than it might for investment decisions.

Whites are less likely to be unrealistic than households categorized as Black or Hispanic and Asian/others, perhaps because of greater financial experience. Whites have more financial experiences with stock ownership than other minority households (Hanna and Lindamood, 2008). In addition, Whites are more likely to be financially literate than Blacks and Hispanics (Lusardi and Mitchell, 2011). Loving, Finke, and Salter (2012) find that the racial/ethnic difference in stock market participation in 2004 (Whites vs. a combined group of Blacks and Hispanics) is not significant after controlling for measures of cognitive ability and investor experience. We do not have good proxies for either factor, but we are controlling for education, and it seems plausible that the racial/ethnic differences in being realistic about retirement adequacy might be because of differences in investor experience.

Households having a defined benefit pension are more likely to be unrealistic than similar households not having a defined benefit pension. This is a contrary result to our expectation because households with defined benefit plan are able to assess their guaranteed retirement income. One possible explanation would be that households might not have good numeracy related to retirement income, and may just assume that simply having these plans will achieve adequacy. Similarly, households with a defined contribution plan are more likely to be unrealistic than those without a defined contribution plan. It is plausible that many workers with defined contribution plans are unfamiliar with features of their plans, may not

be able to accurately assess retirement adequacy, or they may assume that just having a plan may lead to retirement adequacy.

Households who expect that they will retire after 65, or never retire, are less likely to be unrealistic than those with an expected retirement age less than 62. Unrealistic optimists may plan to retire at a relatively earlier age because of their optimism for retirement adequacy. As expected, households willing to take above-average or substantial risk have a higher likelihood of being unrealistic than similar households unwilling to take risk. Pirinsky (2013) suggests that more confident people are more likely to take risks than those with less confidence, and optimism is found to be one of the strongest determinants of being willing to take risk. The more sophisticated respondents might assume that despite the stock market crash leading to big decreases in their retirement wealth, mean reversion of returns might lead to higher returns than the historical means.

Many of the descriptive patterns shown in Table 2 also are significant after controlling for other factors in the logistic regression (Table 3.) The likelihood of being an unrealistic optimist decreases with years of education. However, understanding of the survey questions and use of a financial planner are not significantly related to being unrealistic. The fact that use of a financial planner has a positive though insignificant effect on being unrealistic does not support the idea that financial planners contribute to better understanding of retirement adequacy.

The likelihood of being an unrealistic optimist increases with age, so the previous discussion about possible explanations based on the descriptive patterns in Table 2 is relevant. It is possible that as workers get older, they lower their assessment of what is acceptable. It is unclear whether they are being unrealistic (compared with an objective standard that assumes a goal of maintaining a similar standard of living in retirement) or are just accepting of the likelihood of a lower standard of living in retirement. It is also possible that older workers, having experienced more economic cycles in financial markets, are more likely than younger workers to expect mean reversion in returns. Our objective measure projects balances reported in 2010 forward using historical mean returns.

Controlling for other factors, Whites are less likely than those in other racial/ethnic groups to be unrealistic. This result suggests the need for retirement education targeted at these groups. As with the descriptive results in Table 2, controlling for other factors, those with a defined benefit plan are more likely to be unrealistically optimistic than those without a defined benefit plan. There is a similar effect for having a defined contribution plan. Assuming that our projection of objective adequacy is valid, these two results suggest the need for better employer education for workers with such plans. It is also possible that workers with these plans have greater financial experience, and perhaps are more likely in 2010 to expect mean reversion in returns than less experienced workers without such plans.

Our study highlights the substantial divergence between objective and subjective assessment of retirement adequacy. In addition, the findings in this research are partially consistent with our two hypotheses, indicating that households with greater cognitive ability (as proxied by education) and more financially experienced (as proxied by racial/ethnic group) are more likely to have accurate assessment of their retirement preparedness. However, some of our empirical findings appear puzzling, perhaps because we cannot directly measure the degree of cognitive ability and financial experiences from the SCF dataset. To obtain more robust

results for retirement perception research, a different dataset should be used with direct measures of cognitive ability and/or financial literacy related to the retirement context, such as the Health and Retirement Study (HRS).

References

Agarwal, S., Driscoll, J., Gabaix, X., & Laibson. D. (2009). The age of reason: Financial decisions over the life-cycle and implications for regulation. *Brookings Papers on Economic Activity, 2,* 51–117.

Agarwal, S., & Mazumder, B. (2013). Cognitive abilities and household financial decision-making, *American Economic Journal: Applied Economics, 5,* 193–207.

Ando, A., & Modigliani, F. (1963). The life cycle hypothesis of saving: Aggregate implications and tests, *American Economic Review, 53,* 55–84.

Angeletos, G., Laibson, D., Repetto, A., Tobacman, J., & Weinberg, S. (2001). The hyperbolic consumption model: Calibration, simulation, and empirical evaluation, *The Journal of Economic Perspectives, 15,* 47–68.

Bricker, J., Kennickell, A. B., Moore, K. B., & Sabelhaus, J. (2012). Changes in U.S. family finances from 2007 to 2010: Evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin, 98,* 1–80.

Bricker, J., Bucks, B., Kennickell, A., Mach, T., & Moore, K. (2011). *Surveying the Aftermath of the Storm: Changes in Family Finances From 2007 to 2009.* FEDS Working Paper, 17.

Brown, J., Fang, C., & Gomes, F. (2012). *Risk and Returns to Education*. Social Science Research Network Working Papers Series (available at SSRN: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2021598).

Browning, M., & Crossley, T. F. (2001). The life-cycle model of consumption and saving. *Journal of Economic Perspectives, 15,* 3–22.

Campbell, J. Y.(2006). Household finance. *Journal of Finance, 61,* 1553–1604.

Carroll, C. D. (1997). Buffer-stock savings and the life cycle/permanent income hypothesis. *Quarterly Journal of Economics, 112,* 1–55.

Chan, S., & Stevens, A. (2008). What you don't know cannot help you: Pension knowledge and retirement decision-making. *Review of Economics and Statistics, 90,* 253–266.

Chen, C. C. (2007). *Changes in Retirement Adequacy, 1995–2004: Accounting for Retirement Stages.* Dissertation, The Ohio State University.

Choi, J., Laibson, D., & Madrian, B. (2004). Plan design and 401(k) savings outcomes. *National Tax Journal, 57,* 275–298.

Christelis, D., Jappelli, T., & Padula, M. (2010). Cognitive abilities and portfolio choice. *European Economic Review, 54,* 18–38.

Collins, J. M. (2012). Financial advice: A substitute for financial literacy? *Financial Services Review, 21,* 307–322.

Cordell, D. M., Smith, R., & Terry, A.(2011). Overconfidence in financial planners. *Financial Services Review, 20,* 253–263.

Cummings, B. F., Finke, M. S., & James, R. N. (2011). *The Impact of Cognitive Ability on Roth IRA Ownership.* Social Science Research Network Working Papers Series (available at SSRN: http://ssrn.com/abstract=1968984).

Dohmen, T., Falk, A., Huffman, D., & Sunde, U. (2010). Are risk aversion and impatience related to cognitive ability? *American Economic Review, 100,* 1238–1260.

Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford, CA: Stanford University Press.

Fornero, E., & Monticone, C. (2011). *Financial Literacy and Pension Plan Participation in Italy.* CERP working papers, Center for Research on Pensions and Welfare Policies, Turin, Italy.

Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives, 19,* 25–42.

Glamser, F. (1976). Determinants of a positive attitude toward retirement. *Journal of Gerontology, 31*, 104–107.

Grinblatt, M., Keloharju, M., & Linnainmaa, J. (2011). IQ and stock market participation. *Journal of Finance, 66,* 2119–2164.

Gustman, A. L., Steinmeier, T. L., Tabatabai, N. (2007). *Imperfect Knowledge of Plan Type*. NBER Working Paper, No. 13379.

Hanna, S. D. (2011). The demand for financial planning services. *Journal of Personal Finance, 10,* 36–62.

Hanna, S. D., & Chen, C. C. (2008). Retirement savings. In J. Xiao (Ed.), *Handbook of Consumer Finance Research* (pp. 35–46). New York, NY: Springer Publishing,.

Hanna, S. D., & Lindamood, S. (2008). The decrease in stock ownership by minority households. *Journal of Financial Counseling and Planning, 19,* 46–58.

Huston, S. J., Finke, M. S., & Smith, H. (2012). A financial sophistication proxy for the Survey of Consumer Finances. *Applied Economics Letters, 19,* 1275–1278.

Joo, S., & Grable, J. E. (2001). Factors associated with seeking and using professional retirement-planning help. *Family and Consumer Science Research Journal, 30,* 37–63.

Kilty, K., & Behling, J. (1985). Predicting the retirement intentions and attitudes of professional workers. *The Journal of Gerontology, 40,* 219–227.

Kim, K. T., & Hanna, S. D. (2013). Does financial sophistication matter in retirement preparedness? Evidence from the 2010 Survey of Consumer Finances, *Consumer Interests Annual, 59*.

Kim, K. T., Hanna, S. D., & Chen, S. C. (2014). Consideration of retirement income stages in planning for retirement. *Journal of Personal Finance, 13,* 52–64.

Knoll, M. (2010). The role of behavioral economics and behavioral decision making in Americans' retirement savings decisions. *Social Security Bulletin, 70,* 1–23.

Korniotis, G., & Kumar, A. (2011). Do older investors make better investment decisions? *Review of Economics and Statistics, 93,* 244–265.

Kyrychenko, V., & Shum, P. (2009). Who holds foreign stocks and bonds? Characteristics of active investors in foreign securities. *Financial Services Review, 18,* 1–21.

Laibson, D. (1997). Golden eggs and hyperbolic discounting. *Quarterly Journal of Economics, 62,* 443–478.

Lindamood, S., Hanna, S. D., & Bi, L. (2007). Using the Survey of Consumer Finances: Some methodological considerations and issues. *Journal of Consumer Affairs, 41,* 195–222.

Loving, A. C., Finke, M. S., & Salter, J. R. (2012). Explaining the 2004 decrease in minority stock market ownership. *Review of Black Political Economy, 39,* 403–425.

Lusardi, A., & Mitchell, O. S. (2007). Baby boomers' retirement security: The role of planning, financial literacy and housing wealth. *Journal of Monetary Economics, 54,* 205–224.

Lusardi, A., & Mitchell, O. S. (2011). *Financial Literacy and Planning: Implications for Retirement Wellbeing*. NBER Working Paper, No. 17078.

Malroutu, Y., & Xiao, J. (1995). Perceived adequacy of retirement income. *Financial Counseling and Planning, 6,* 17–23.

McArdle, J. J., Smith, J. P., & Willis, R. (2011). Cognition and economic outcomes in the Health and Retirement Survey. In D. A. Wise (Ed.), *Explorations in the Economics of Aging* (pp. 209–233). Chicago, IL: University of Chicago Press.

Modigliani, F. & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. In K. Kurihara (Ed.), *Post-Keynesian Economics* (pp. 388–436). New Brunswick, NJ: Rutgers University Press.

Montalto, C. P., Yuh, Y., & Hanna, S. D. (2000). Determinants of planned retirement age. *Financial Services Review, 9,* 1–15.

Morton, H. (1993). *The Story of Psychology*. New York, NY: Bantam Double Dell Publishing Group, Inc.

Munnell, A. H. (2012). *2010 SCF Suggests Even Greater Retirement Risks*. Center for Retirement Research at Boston College Issue in Brief 12–15.

Munnell, A. H., Golub-Sass, F., Soto, M., & Webb, A. (2008). *Do Households Have a Good Sense of Their Retirement Preparedness?* Center for Retirement Research at Boston College Issue in Brief 8–11.

Palmer, B. A. (1992). *Establishing Retirement Income Objectives: The 1991 Retire Project*. Benefits Quarterly, Third Quarter, 6–15.

Palmer, B. A. (1994). *Retirement Income Replacement Ratios: An Update.* Benefits Quarterly, Second Quarter, 59–75.

Pirinsky, C. (2013). Confidence and economic attitudes. *Journal of Economic Behavior & Organization, 91,* 139–158.

Ricciardi, V., & Simon, H. K. (2000). What is behavioral finance? *Business, Education & Technology Journal, 2,* 1–9.

Scholz, J., Seshadri, A., & Khitatrakun, S. (2006). Are Americans saving "optimally" for retirement? *Journal of Political Economy, 114,* 607–643.

Shefrin, H. M., & Thaler, R. H. (1988). The behavioral life-cycle hypothesis. *Economic Inquiry, 26,* 609–643.

Social Security Administration. (2014). *The 2014 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. (available at http://www.ssa.gov/oact/TR/2014/tr2014.pdf).

Stango, V., & Zinman, J. (2009). Exponential growth bias and household finance. *The Journal of Finance, 64,* 2807–2849.

U. S. Department of Labor. (2012). *Consumer Expenditure Report: Consumer Expenditures in 2010*. (available at http://www.bls.gov/cex/csxann10.pdf).

Yao, R., Gutter, M. S., & Hanna, S. D. (2005). The financial risk tolerance of Blacks, Hispanics and Whites. *Financial Counseling and Planning, 16,* 51–62.

Yuh, Y. (2011). Assessing adequacy of retirement income for US households: A replacement ratio approach. *Geneva Papers on Risk and Insurance-Issues and Practice, 36,* 304–323.

Yuh, Y., Hanna, S. D., & Montalto, C. P. (1998). Mean and pessimistic projections of retirement adequacy. *Financial Services Review, 9,* 175–193.