FINANCIAL SERVICES REVIEW

Financial Services Review 26 (2017) 1–18

Individual estimates of life expectancy and consumption patterns

Derek R. Lawson, CFP[a]*, Stuart J. Heckman, Ph.D., CFP[a]

[a]*Department of Personal Financial Planning, Kansas State University, 1324 Lovers Lane, 303 Justin Hall, Manhattan, KS 66506, USA*

Abstract

Previous research reveals a paucity of retirement preparedness in the United States. With the shift to defined contribution plans, retirement planning now falls on the shoulders of consumers. Using the 2013 Survey of Consumer Finances (SCF), the relationship between subjective life expectancy and consumption is investigated. Specifically, regression analyses examine the relationship between subjective life expectancy and three indicators of consumption: financial assets, credit card debt, and saving behavior. A secondary analysis separated respondents near retirement (i.e., within 10 years) and far from retirement (i.e., more than 10 years) to determine if retirement saliency affects the relationship between life expectancy and consumption. The influence of life expectancy on consumption is analyzed by separating life expectancy into two periods: remaining work life and retirement life. Results indicate that remaining work life expectancy and retirement life expectancy are associated with financial assets and that retirement life expectancy is associated with savings behavior.

JEL classification: D14; E21

Keywords: Consumption; Life expectancy; Retirement; Saving

1. Introduction

One result of the shift away from defined benefit plans to defined contribution plans is that household consumption decisions have a substantial and lasting impact on a household's ability to prepare for retirement. Retirement planning is a complex task for the average

* Corresponding author. Tel.: +1-515-707-3729; fax: +1-785-532-5505.
E-mail address: drlawson@ksu.edu (D.R. Lawson)

1057-0810/17/$ – see front matter

consumer given all the uncertainty involved, for example, length of time in retirement, inflation, rates of return, and so forth. Additionally, consumers have difficulty in making decisions under uncertainty and are prone to many biases and mistakes (Tversky & Kahneman, 1974). Now that most consumers bear the investment and longevity risk associated with retirement funding, consumption decisions throughout the life cycle have an important role to play in shaping retirement adequacy.

The current study focuses on one particular source of uncertainty, an individual's life expectancy, and examines how subjective estimates of life expectancy influence household consumption. Because of the dynamic relationship between current age, retirement age, and life expectancy and consumption choice, the current study analyzes the influence of life expectancy on consumption by dividing the respondents' remaining life expectancy into two periods—remaining work life expectancy and retirement life expectancy. From a life cycle perspective, examining these two periods of time (i.e., remaining working period and retirement period) highlights the tradeoff between saving and dissaving.

1.1. Literature review

Some studies find subjective life expectancy to be a valuable predictor of actual mortality (Hamermesh, 1985; Hurd & McGarry, 2002). Elder's (2007) findings confirm individual estimates of life expectancy to be accurate but noted an interesting pattern in that individuals nearing retirement had higher discount rates for their future. His results show that individuals nearing or just starting retirement were pessimistic about living to age 75, but became optimistic about living to age 85 once they survived to age 75. This creates a misalignment in the savings patterns needed to smooth consumption because the initial retirement period planned for is too short and needs to be corrected for a longer horizon.

There is some evidence to support the notion that subjective life expectancy influences saving and consumption patterns. For example, Bloom, Canning, Moore, and Song's (2006) findings show that increased subjective life expectancy yields increased savings at any age. They also look at differences between a husband's and wife's subjective life expectancy estimates on household wealth and find that a 10% increase in a husband's life expectancy results in an increase of household wealth by $27,600, and a 10% increase in the wife's life expectancy results in an increase in household wealth by $32,700. Other findings show that an increase in life expectancy is associated with an increase in savings, but most of these findings are based on data from East Asian countries because of their increases in life expectancies (Bloom, Canning, & Graham, 2003; Tsai, Chu, & Chung, 2000). Yet, other research finds contradictory results indicating that rises in life expectancy mostly increase expected retirement age when individuals are not subject to mandatory retirement ages (Deaton & Paxson, 2000). Bloom et al. (2003) find improved health has an ambiguous effect on savings rates because it may increase remaining work life expectancy. Because of this, savings rates do not necessarily need to increase because compounded interest on current savings can help cover expenditures later on (Bloom, Canning, & Moore, 2004).

Spaenjers and Spira (2015) analyze the empirical relationship between subjective life expectancy and portfolio choice. Their findings show that life expectancy positively influenced the amount allocated towards equities within portfolios. That is, after controlling for

effects related to gender-specific age, health, and other socioeconomic characteristics, people with longer life expectancies have greater amounts of equities than their counterparts. They also compare people with the same subjective life expectancies to see if bequest motives make a difference on portfolio allocations. They find that those without bequest motives had a decreased equity allocation as compared to those with bequest motives, indicating that people with bequest motives may view their life horizons as "indefinite" (Spaenjers & Spira, 2015, p. 104).

An important consideration for retirement planning and savings decisions is an individual's planned retirement age. Montalto, Yuh, and Hanna (2000) examine the determinants of planned retirement age *before* retirement. They find that as people get older their planned retirement age also increases. Specifically, they find that as full-time workers age from 35 to 45, their expected retirement age increases by 1.08 years, while workers aging from 45 to 55, increase their expected retirement age by 3.41 years. Finally, those workers aging from 55 to 65 increase their expected retirement date by 5.72 years. They also find that life expectancy, non-investment income, and educational attainment are all positively associated with planned retirement age. Financial assets (excluding IRA/KEOGH and defined contribution plans), having a defined benefit plan, and low-skilled occupations are negatively associated with expected retirement age (Montalto et al., 2000).

1.2. Summary and gap

While subjective life expectancy has been shown to influence consumer savings (Bloom et al., 2003), there is little empirical research examining the influence on household consumption behavior, particularly when using the Survey of Consumer Finances (SCF). Other research utilizing the SCF finds subjective life expectancy influences annuity purchase decisions (Gupta & Li, 2012) and construction of investment portfolios (Spaenjers & Spira, 2015). Therefore, the current study explores the following research question:

RQ: What effect do subjective estimates of life expectancy have on consumption decisions?

1.3. Theoretical framework

1.3.1. Life cycle hypothesis

First posited by Modigliani and Brumberg (1954), the life cycle hypothesis is driven by individual utility—a function of an individual's aggregate consumption. In this model, it is assumed that individuals aim to maximize their lifetime utility given their total lifetime wealth, *W,* which is the summation of one's current level of resources (A_0) and their future earnings (H) (Yuh & Hanna, 2010).

$$W = A_0 + H$$

If there is no uncertainty about remaining work life expectancy (RWLE) and retirement life expectancy (RLE), and a zero real rate of interest, as initially assumed in Modigliani and Brumberg's model, then optimal consumption, *C*, is equal to total wealth divided by total life expectancy (where LE = RWLE + RLE):

$$C = \frac{W}{LE}$$

To smooth consumption, individuals may borrow initially until income is high enough to support expenses. They then save when income is above expenses and dissave during retirement. Ando and Modigliani (1963) present the following equation for total consumption, C, in year t, for a person that is age T:

$$C_t^T = \Omega_t^T \nu_t^T$$

where Ω_t^T represents what Ando and Modigliani (1963) call a proportionality factor, which depends on the rate of return an individual can earn on assets, the individual's current age, and the form of the utility function to be used. The second part, ν_t^T, represents total resources available to that individual, which can be expressed as net worth.

Based on this framework, holding all else (especially retirement age) constant, it is expected that an increase in life expectancy would decrease the amount of consumption in each year, t. In other words, if total resources remain constant and an individual lives longer, consumption would need to decrease, assuming that the compounded interested earned on assets from the previous periods are insufficient to fund extra years of income needs.[1]

1.3.2. Behavioral life cycle hypothesis

To consider some of the behavioral tendencies inherent in humans, Shefrin and Thaler (1988) developed a derivative of the life cycle model known as the behavioral life cycle hypothesis. While they state that the life cycle hypothesis was useful in its own right, particularly as a prescriptive model, they acknowledge that individuals do not always act in an optimal manner. Therefore, modifications to the model were made to make the "theory more behaviorally realistic" (Shefrin & Thaler, 1988, p. 1). They modify the life cycle model to account for three human behavior factors often missing from economic theory: (a) self-control, (b) mental accounting, and (c) framing.

According to Shefrin and Thaler (1988), self-control is made up of three components: (a) internal conflict, (b) temptation, and (c) willpower. Internal conflict is described as an inherent battle between the planner and the doer within each individual. The planner is concerned with the long term while the doer aims to maximize utility in the present. Temptation deals with the choices that are presented to individuals, recognizing that for each choice there are differing degrees of enticement. Willpower is the mental cost associated with resisting temptation and the degree of temptation influences how much willpower the individual must expend to make a choice that aligns with their utility-maximizing preference for both the long- and short-term. The more an individual is tempted to indulge in something, the more willpower they must expend to resist the temptation. Although willpower can be taxing, it is necessary to reduce consumption (Shefrin & Thaler, 1988). Individuals will engage in willpower if the utility lost from less consumption (i.e., not succumbing to temptation) is less than the utility cost of engaging in willpower. Hence, willpower is exerted when the net marginal cost of using it is greater than zero (Shefrin & Thaler, 1988). Self-control, then, is the relationship among internal conflict, temptation, and willpower.

Consumption in today's economy is heavily influenced by advertising, which is designed to convince consumers that they need products they previously had not considered. Approximately $180 billion is spent annually on advertising in the United States (and projected to grow to nearly $220 billion by 2018) (Statista, 2016), which results in nearly constant exposure to advertisements. Consumers are constantly at conflict with themselves because they are tempted to buy things that they may not actually need or want. Shefrin and Thaler (1988) argue that an economic savings model that does not factor in self-control is a mis-specified model. Thus, willpower—the mental costs of resisting temptation—must be considered.

A lack of self-control can lead to financial problems down the road (e.g., inadequate retirement preparation), whereas too much self-control can deprive someone of their wants and needs. Although individuals may expect to live a long time in retirement, they may lack the ability to exert self-control and defer consumption from today to future periods by saving. From this perspective, it is predicted that an increase in life expectancy would *not* result in a change in consumption because of willpower and self-control issues among working households for which retirement is not salient. That is to say, retirement may be too far in the future to exert self-control and reduce consumption for young households. However, as retirement becomes more salient (i.e., as households near retirement) it is expected that longer life expectancies would have a negative effect on consumption.

1.3.3. Summary

Subjective life expectancy should have a negative effect on consumption according to the life cycle hypothesis. In general, those who expect to live longer should save more and spend less. However, consumers may struggle with self-control according to the behavioral life cycle hypothesis. In the case of self-control problems, life expectancy is expected to have a negligible or inconsistent effect on consumption for individuals far from retirement but may have a negative effect on consumption for individuals near retirement. That is to say, for individuals near retirement, those who expect to live longer should save more and spend less than individuals far from retirement.

2. Method

2.1. Data

The 2013 SCF, a triennial survey sponsored by the Federal Reserve Board (Fed), is used and our sample is limited to respondents who work full-time, expect to retire, and have a retirement life expectancy period greater than zero (N = 2,632). The reason for this restriction is that full-time workers have the greatest flexibility in adjusting saving and consumption decisions based on their life expectancy. Retired households or those who work less than full-time may systematically differ from full-time workers. Additionally, the sample is limited to those with a RLE period greater than zero because a few respondents had a negative RLE (i.e., the respondent expected to retire at a date later than his or her life expectancy), possibly indicating that they did not understand the questions. The switch

variable in the SCF is used to obtain respondent characteristics (Lindamood, Hanna, & Bi, 2007). For consistency, weighted statistics and regression models are presented, although multivariate results are robust to weighting. The SCF relies on a complex sampling design (Nielsen & Seay, 2014; Shin & Hanna, 2016) and uses multiple imputation to handle missing data and to help protect participants' privacy (Montalto & Sung, 1996). Therefore, an available Stata program (see Nielsen, 2015) is used to implement the Repeated Imputation Inference (RII) method (Montalto & Sung, 1996) while also using the replicate weight file provided by the Fed to bootstrap the standard errors (Nielsen & Seay, 2014). This procedure provides estimates of variance that are closer to the true variance.

2.2. Variables

Three dependent variables were chosen to represent consumption decisions in the SCF: (a) financial assets, (b) credit card balance, and (c) saving behavior. Both financial assets and credit card balances are log-transformed to correct for the highly skewed distribution. Our third dependent variable is saving behavior (whether or not the respondent saved or not).[2] This is measured by whether or not the household reported spending less than income, after considering durable goods purchases (in particular, costs associated with purchasing a car, home, or investments are considered savings in the SCF). Households who spent all or more of their income are described as non-savers.

The key independent variables are remaining work life expectancy (RWLE) and retirement life expectancy (RLE). RWLE is computed by subtracting respondent age from respondent's estimated retirement age. RLE is computed by subtracting respondent's retirement age from respondent's estimated life expectancy. From a life cycle perspective, examining RWLE and RLE is reasonable as it highlights the tradeoff between saving (during RWLE) and dissaving (during RLE). Delaying retirement while holding life expectancy constant has the beneficial effect (assuming a life cycle hypothesis perspective) of increasing wealth while reducing the number of years without earned income, which has an overall positive effect on consumption during the remainder of the life. The opposite also holds—retiring early reduces wealth while increasing the number of years without earned income. Therefore, coding each period should yield clearer results.

To identify the ceteris paribus influence of life expectancy on consumption decisions, a number of variables were included as controls, including relationship status and gender (married, single male, single female, or partner), racial or ethnic status (White, Black, Hispanic, or Other), education (less than high school, high school, some college, bachelor's degree, or graduate degree), whether or not the respondent has children in the household that are under the age of 18, and health status (poor health vs. good health). Other controls are if the respondent contributes to a retirement plan at work, if they have access to $3,000 from a family member or friend in the event of an emergency, their planning horizon (short, intermediate, or long), income (log), net worth (log; only for the saved model), and the degree to which the survey administrator believed that the respondent understood the SCF questions (poor/fair, good, or excellent). To account for negative values of net worth, log (0.01) is used. Additional controls are whether or not the respondent owns a home, plans to

give a bequest (Spaenjers & Spira, 2015), and if they expect to receive an inheritance in the future.

2.3. Models

Ordinary least squares is used to model log credit card balance and log financial assets and binary logistic regression is used to model whether or not the household saved. The coefficients on RLE and RWLE are the key parameters of interest. After running each of the models on the full sample of full-time workers who expect to retire and have a RLE greater than zero (N = 2,632), each model is also run to compare those with a RWLE of less than or equal to 10 years (n = 617) with those who have a RWLE greater than 10 years (n = 1,212). The secondary analysis helps examine whether there were differences between the two groups based on the saliency of retirement, as suggested by the behavioral life cycle model, and is limited to those between the ages of 35 and 62. Other recent studies have used 35 to 60 (Kim & Hanna, 2015a) and 35 to 70 (Kim, Hanna, & Chen, 2014), stating that those under the age of 35 are likely to have significant changes in jobs and/or marital status, which reduces the quality of the expected retirement measure. Given that many respondents expect to retire in their mid-60s (about 30% expect to retire at age 65 and about 56% expect to retire between the ages of 63 and 70), age 62 is used as the cutoff age for the secondary analysis.

3. Results

3.1. Descriptive results

Most respondents are in a relationship—53% are married and 11% have a partner. Most of the respondents are White (70%) and 48% have completed a college degree. Fifty-nine percent of the respondents have a retirement plan at their workplace. Most respondents (72%) have access to at least $3,000 in case of an emergency through a family member or friend. Half of the respondents (50%) plan for the intermediate-term (2–9 years) while many (35%) plan for the short-term (within a year). Approximately half of the respondents have children under the age of 18 (51%). Almost all of the respondents are in good health (85%). Nearly 48% of the respondents have an excellent understanding of the SCF questions while 45% have a good understanding and approximately 6% have a poor or fair understanding of the SCF questions. A majority of respondents spend less than they make (63%), while nearly 11% say that they spend more than they earned over the last year. Respondents report a median income of $68,988 with a median net worth of $103,980, median financial assets totaling approximately $225,000, and a majority (69%) owned a home. Approximately 36% plan to give a bequest while 17% are planning on receiving an inheritance. Most continue to carry some level of debt (86%) with a median debt level of $65,600. Nearly 47% hold credit card debt with an average balance of $2,792. The average age of the respondent is in the mid-40s (M = 44.45, SD = 5.52) with an average expected retirement age of 63.56 (SD = 2.92), and an average subjective life expectancy of 84.60 (SD = 4.36).

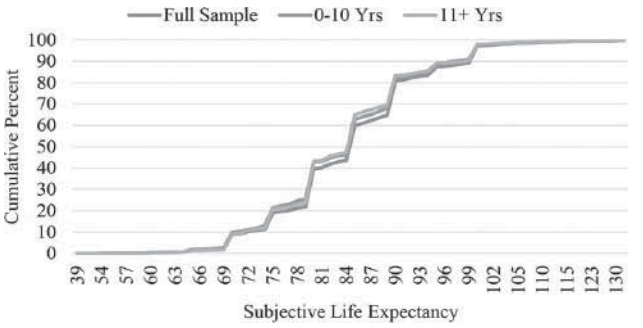

Fig. 1. Cumulative distribution of subjective life expectancy for the full sample (N = 2,632), for those near retirement (n = 617), and for those further from retirement (n = 1,212).

Fig. 1 shows the cumulative distribution of life expectancy for the full sample, and for those near and far from retirement. The range on life expectancy is 39 years to 150 years with approximately 95% of respondents expecting to live somewhere between 70 and 100 years old. Given the purpose of this study, even if people have unreasonable expectations about their life expectancy, outliers should not affect our results because we are interested in how their life expectancy perceptions influence consumption decisions. Fig. 2 presents the cumulative distribution of expected retirement age for the full sample, and for those near and far from retirement. The range for expected retirement age is 24 years to 102 years of age with nearly 60% expecting to retire between age 63 and 75, and 95% of respondents expect to retire between ages 49 and 79. Again, it was considered important to keep the outliers on retirement age because the purpose to see how estimates of life expectancy and retirement age influence consumption decisions during each period. Finally, mean remaining work life expectancy (RWLE) is 19.11 (SD = 5.06) and the average retirement life expectancy (RLE) is 21.05 (SD = 4.96).

In the secondary analysis, respondents who are within 10 years of retirement (i.e., near retirement) have an average age of 55.44 (SD = 2.20) with an expected retirement age of 61.91 years (SD = 2.17), whereas those who are further from retirement (11 or more years away) have an average age of 45 years (SD = 2.65) and expect to retire just before age 65 (M = 64.88, SD = 2.16). Those who are closer to retirement expect to live a little longer (M = 84.10, SD = 4.17) than those who are further from retirement (M = 83.72, SD = 4.08).

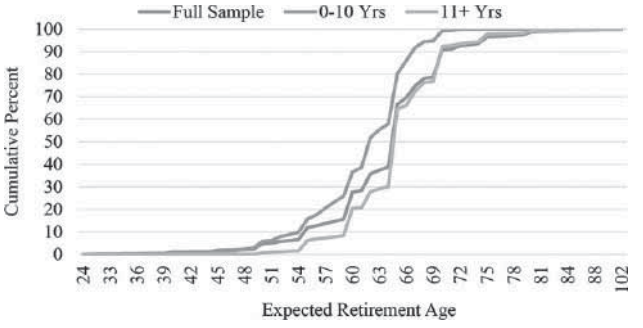

Fig. 2. Cumulative distribution of expected retirement age for the full sample (N = 2,632), for those near retirement (n = 617), and for those further from retirement (n = 1,212).

Respondents expecting to retire in the next 10 years expect to have a longer retirement period ($M = 22.19$, $SD = 4.70$) than those who are further from retirement ($M = 18.85$, $SD = 4.21$). Respondents who expect to retire within the next 10 years expect to work an average of 6.47 years more ($SD = 1.12$) while those expecting to retire later expect to work an average of 19.85 more years ($SD = 2.70$).

Respondents near retirement have slightly more than twice the median net worth ($260,000) than those who are further from retirement ($128,770), and have approximately 42% more financial assets (median = $367,400) than those further from retirement (median = $257,300). About 84% of those near retirement own their home whereas nearly 72% of those 11 or more years away from retirement own their home. Of those near retirement, approximately 66% report spending less than they made in the prior year and 11% report spending more than they make, whereas only 60% of those further from retirement report saving and nearly 13.5% spend more than they make. An interesting find was that both groups have a higher prevalence of having debt (87% for those near retirement, 88% those further from retirement) than the full sample (86%) and holding credit card debt (49% for those near retirement, 48% for those further from retirement) than the full sample (47%). Absolute dollar amounts of total debt ($72,000 for those near retirement, $94,000 for those further from retirement) and credit card debt ($3,150 for those close to retirement, $3,203 for those further from retirement) are also higher than the full sample ($65,600, $2,792, respectively). Approximately 35% of those within 10 years of retirement have minor children in the home whereas 64% of those 11 or more years away from retirement have minor children at home. Almost 70% of those nearing retirement have a retirement plan at their place of employment, while only 60% of those not expecting to retire within the decade have such a plan. Finally, proportionately more of those who are nearing retirement (56%) plan for the intermediate-term than did those who were further from retirement (49%), while those further from retirement are planning for the short-term proportionately more (35%) than those near retirement (32%). Full descriptive results can be seen in Table 1.

3.2. Multivariate results

The regression models are presented in Tables 2 through 4 with each table containing the overall model first, followed by the model representing full-time workers ages 35 to 62 expecting to retire in the next 10 years, and ending with the model for full-time workers ages 35 to 62 expecting to retire beyond 10 years.

3.2.1. Financial assets

Considering first the factors that influence the log of financial assets, RLE and RWLE are significant. Contrary to expectations, RLE is negatively associated, indicating that a one-year increase in RLE is associated with a 1% decrease in financial assets ($B = -0.01$, $SE = 0.00$, $p < 0.01$). RWLE is also negatively associated with log financial assets—a one-year increase in a respondent's working career is associated with a 4% reduction in financial assets ($B = -0.04$, $SE = 0.00$, $p < 0.01$). However, this makes conceptual sense given that those with a longer time until retirement are likely to have less financial assets. Owning a home and indicating an intent to leave a bequest are both positively associated with financial asset

Table 1 Sample descriptives of full-time workers: Full sample, sample of those near retirement, and sample of those more than 10 years from retirement

	Full model (N = 2,632)		0–10 years (n = 617)		11+ years (n = 1,212)	
Variable (reference group)	*M*/%	*SD*	*M*/%	*SD*	*M*/%	*SD*
Age	44.45	5.42	55.44	2.20	45.03	2.65
Retirement age	63.56	2.92	61.91	2.17	64.88	2.16
Life expectancy measures						
Subjective life expectancy	84.60	4.36	84.10	4.17	83.72	4.08
Retirement life expectancy	21.05	4.96	22.19	4.70	18.85	4.21
Remaining work life expectancy	19.11	5.06	6.47	1.12	19.85	2.70
Income and asset info						
Income[a]	$68,988		$83,192		$78,119	
Net worth[a]	$103,980		$260,000		$128,770	
Financial assets[a]	$224,950		$367,400		$257,300	
Owns home	69.18%		84.29%		71.96%	
Bequest motive	36.02%		35.48%		32.25%	
Receive inheritance	17.41%		15.44%		18.18%	
Debt burden						
Have debt	86.06%		87.05%		88.28%	
Have credit card	76.55%		83.35%		76.81%	
Have credit card balance	46.83%		49.35%		48.41%	
Total debt[a]	$65,600		$72,000		$94,000	
Total credit card balance[b]	$2,792	$2,932	$3,150	$3,194	$3,203	$3,049
Spending behavior						
Spending > Income	10.98%		11.02%		13.45%	
Spending = Income	25.56%		23.03%		26.28%	
Spending < Income	63.45%		65.95%		60.27%	
Relationship status						
Married	53.36%		59.00%		58.26%	
Single male	13.42%		10.51%		12.62%	
Single female	22.78%		25.13%		19.44%	
Partner	10.44%		5.36%		9.69%	
Racial/ethnic status						
White	69.96%		73.21%		70.07%	
Black	13.96%		13.74%		13.60%	
Hispanic	11.07%		9.60%		10.68%	
Other	5.01%		3.46%		5.65%	
Education						
No high school diploma	5.96%		8.08%		5.51%	
High school	20.05%		20.74%		19.20%	
Some college	25.78%		26.04%		25.76%	
Bachelor's	28.58%		24.79%		29.97%	
Graduate	19.62%		20.36%		19.57%	
Have children < 18 Years	50.58%		35.65%		64.27%	
Perceived poor health	14.74%		16.69%		14.22%	

Table 1 (Continued)

Variable (reference group)	Full model (N = 2,632)		0–10 years (n = 617)		11+ years (n = 1,212)	
	M/%	*SD*	*M*/%	*SD*	*M*/%	*SD*
Understanding of SCF's						
Poor/fair	6.36%		6.45%		5.02%	
Good	45.37%		45.61%		44.32%	
Excellent	48.27%		47.94%		50.66%	
Has retirement plan	58.98%		69.21%		60.54%	
Has access to $3,000	72.71%		74.80%		71.31%	
Planning horizon						
Short	35.49%		31.54%		34.59%	
Intermediate	49.89%		55.50%		49.25%	
Long	14.63%		12.95%		16.17%	

Source: Weighted analysis of the 2013 Survey of Consumer Finances.

Note: Analysis includes only those that are full-time, expect to retire, and have a retirement life expectancy greater than zero.

[a] Results are reported as the Median.

[b] Reported as Mean because of the Median equaling zero.

ownership. Unmarried individuals have less financial assets than their married counterparts. When compared to White workers, non-White workers also have less financial assets. Education is positively associated with financial assets, as is income. Those with minor children and/or in poor health are found to have less financial assets than those without children and in good health. Full-time workers that are perceived to have an excellent understanding of the SCF questions have greater financial assets than those with a good understanding of the questions, while those with a poor-to-fair understanding of the SCF questions have less financial assets than do respondents who have a good understanding of the questions. Workers with a retirement plan and access to $3,000 are found to have a positive association with financial assets, too. Finally, those that have planning horizons of less than 10 years are less likely to accumulate financial assets compared with those who plan for the long term.

There are some slight differences in the secondary analysis where the sample is split into those who are near retirement (within 10 years) and those who are far from retirement (more than 10 years). RLE and RWLE are not significantly associated with financial assets for those who expect to retire within 10 years. However, RLE and RWLE are significant in determining financial assets for respondents that expect to retire beyond 10 years. Again, results seem odd for RLE, as an increase of RLE by one year is associated with a decrease in financial assets by 2% ($B = -0.02$, $SE = 0.01$, $p < 0.01$). An increase in RWLE by one more working year results in a 3% decrease in financial assets ($B = -0.03$, $SE = 0.01$, $p < 0.01$).

3.2.2. Credit card debt

Among credit card holders, RLE and RWLE have no significant effect on outstanding credit card balance. Home ownership is positively associated with the amount of credit card debt held. Single males hold less amounts of credit card debt when compared to their married counterparts. Compared to White households, households of other races and ethnicities

Table 2 OLS regressions on the log of financial assets, full sample of full-time workers, sample of those near retirement, and sample of those more than 10 years from retirement

	Full model (N = 2,632)			0–10 years (n = 617)			11+ years (n = 1,212)		
Variables (reference group)	*B*	SE. *B*	*p*	*B*	SE. *B*	*p*	*B*	SE. *B*	*p*
Retirement life expectancy	−0.01	(0.00)	<.001	0.01	(0.01)	0.408	−0.02	(0.01)	0.007
Remaining work life expectancy	−0.04	(0.00)	<.001	−0.02	(0.03)	0.499	−0.03	(0.01)	0.004
Own's home	0.79	(0.10)	<.001	0.53	(0.23)	0.020	0.95	(0.14)	<.001
Bequest motive	0.52	(0.07)	<.001	0.32	(0.15)	0.040	0.72	(0.09)	<.001
Receive inheritance	0.15	(0.09)	0.074	−0.01	(0.15)	0.962	0.09	(0.12)	0.449
Relationship status (married)									
Single male	−0.31	(0.11)	0.004	−0.58	(0.29)	0.048	−0.46	(0.16)	0.005
Single female	−0.50	(0.13)	<.001	−0.81	(0.31)	0.009	−0.60	(0.19)	0.002
Partner	−0.26	(0.12)	0.031	−0.27	(0.34)	0.425	−0.01	(0.18)	0.955
Racial/ethnic status (White)									
Black	−0.64	(0.13)	<.001	−0.94	(0.30)	0.002	−0.37	(0.18)	0.042
Hispanic	−0.48	(0.13)	<.001	−0.95	(0.36)	0.009	−0.50	(0.23)	0.029
Other	0.04	(0.11)	0.717	0.16	(0.39)	0.673	0.08	(0.14)	0.546
Education (no high school diploma)									
High school	0.87	(0.19)	<.001	0.95	(0.39)	0.016	0.56	(0.30)	0.063
Some college	1.55	(0.21)	<.001	1.52	(0.37)	<.001	1.34	(0.31)	<.001
Bachelor's	1.97	(0.22)	<.001	1.62	(0.42)	<.001	1.95	(0.31)	<.001
Graduate	2.29	(0.22)	<.001	1.81	(0.44)	<.001	2.28	(0.34)	<.001
Log of income	0.62	(0.13)	<.001	0.73	(0.27)	0.007	0.61	(0.16)	<.001
Have kids	−0.16	(0.04)	<.001	−0.26	(0.09)	0.004	−0.17	(0.05)	0.001
Perceived poor health	−0.21	(0.10)	0.040	0.13	(0.21)	0.540	−0.26	(0.18)	0.148
Understand SCF questions? (good)									
Poor/fair	−0.45	(0.18)	0.015	−0.49	(0.38)	0.202	−0.87	(0.40)	0.029
Excellent	0.15	(0.07)	0.024	−0.11	(0.16)	0.495	0.18	(0.10)	0.088
Having retirement plan	1.26	(0.07)	<.001	1.27	(0.15)	<.001	1.38	(0.10)	<.001
Access to $3,000	0.91	(0.10)	<.001	0.75	(0.22)	0.001	0.87	(0.15)	<.001
Planning horizon (long)									
Short	−0.64	(0.11)	<.001	−0.84	(0.25)	0.001	−0.48	(0.16)	0.003
Intermediate	−0.29	(0.09)	0.001	−0.31	(0.21)	0.132	−0.24	(0.11)	0.031
Constant	1.28	(1.43)	0.369	0.56	(3.09)	0.857	1.03	(1.81)	0.569
R^2	0.57			0.58			0.56		
F	142.68			34.58			63.86		

Source: Weighted analysis of the 2013 Survey of Consumer Finances; RII technique and bootstrapping used.

Note: Analysis includes only those that are full-time, expect to retire, and have a retirement life expectancy greater than zero.

(e.g., Asian, Native American, etc.) have lower balances and Hispanic households have higher balances. More educated workers hold more credit card debt than did their peers (with the exception of those having a graduate degree). Those who are in worse health have less credit card debt, and those who have a retirement plan have more credit card debt than those who did not have a retirement plan at work. Lastly, workers with shorter planning horizons hold more credit card debt than do their counterparts with longer planning horizons.

Similar results are found in the secondary analysis—RLE and RWLE are not significantly associated with credit card balances for respondents near or far from retirement.

Table 3 OLS regressions on the log of credit card balance, full sample of full-time workers, sample of those near retirement, and sample of those more than 10 years from retirement

	Full model (N = 2,632)			0–10 years (n = 617)			11+ years (n = 1,212)		
Variables (reference group)	B	SE. B	p	B	SE. B	p	B	SE. B	p
Retirement life expectancy	−0.01	(0.01)	0.338	−0.01	(0.01)	0.399	−0.01	(0.01)	0.469
Remaining work life expectancy	0.00	(0.01)	0.627	−0.04	(0.06)	0.529	0.01	(0.02)	0.410
Own's home	0.73	(0.14)	<.001	0.42	(0.43)	0.329	0.52	(0.23)	0.024
Bequest motive	−0.11	(0.14)	0.455	−0.48	(0.29)	0.103	0.10	(0.22)	0.653
Receive inheritance	−0.24	(0.19)	0.196	0.56	(0.43)	0.197	−0.30	(0.25)	0.228
Relationship status (married)									
Single male	−0.93	(0.19)	<.001	−0.22	(0.41)	0.596	−0.99	(0.39)	0.010
Single female	−0.41	(0.22)	0.056	−0.94	(0.40)	0.021	−0.01	(0.28)	0.969
Partner	0.34	(0.21)	0.116	0.93	(0.72)	0.193	0.50	(0.33)	0.134
Racial/ethnic status (White)									
Black	0.22	(0.24)	0.370	1.56	(0.47)	0.001	−0.46	(0.35)	0.199
Hispanic	0.73	(0.24)	0.003	0.32	(0.83)	0.699	0.25	(0.37)	0.506
Other	−0.92	(0.33)	0.005	0.87	(0.73)	0.232	−1.24	(0.45)	0.006
Education (no high school diploma)									
High school	0.80	(0.29)	0.006	−0.16	(0.66)	0.806	1.02	(0.40)	0.010
Some college	1.44	(0.31)	<.001	0.83	(0.59)	0.158	1.46	(0.41)	<.001
Bachelor's	1.24	(0.34)	<.001	−0.14	(0.66)	0.833	1.20	(0.45)	0.007
Graduate	0.70	(0.36)	0.056	−0.30	(0.72)	0.680	0.99	(0.50)	0.048
Log of income	0.07	(0.07)	0.316	−0.53	(0.18)	0.004	0.03	(0.09)	0.783
Have kids	−0.06	(0.06)	0.324	−0.04	(0.19)	0.840	−0.06	(0.09)	0.483
Perceived poor health	−0.58	(0.17)	0.001	−1.02	(0.46)	0.027	−0.33	(0.28)	0.234
Understand SCF questions? (good)									
Poor/fair	−0.36	(0.25)	0.157	−1.41	(0.79)	0.075	0.13	(0.44)	0.761
Excellent	−0.06	(0.14)	0.691	0.07	(0.33)	0.839	−0.12	(0.24)	0.605
Having retirement plan	0.46	(0.14)	0.002	0.92	(0.34)	0.006	0.57	(0.21)	0.007
Access to $3,000	0.27	(0.15)	0.074	0.82	(0.33)	0.013	0.51	(0.25)	0.039
Planning horizon (long)									
Short	0.99	(0.21)	<.001	1.25	(0.51)	0.015	0.65	(0.38)	0.087
Intermediate	0.59	(0.18)	0.001	0.52	(0.45)	0.253	0.69	(0.36)	0.054
Constant	0.78	(0.86)	0.364	8.24	(2.11)	<.001	0.95	(1.26)	0.447
R^2	0.05			0.09			0.04		
F	5.39			2.30			2.06		

Source: Weighted analysis of the 2013 Survey of Consumer Finances; RII technique and bootstrapping used.
Note: Analysis includes only those that are full-time, expect to retire, and have a retirement life expectancy greater than zero.

3.2.3. Saving behavior

Looking at factors that influence whether or not a worker saved, RLE is again significant and positively associated with the likelihood of saving ($B = 0.01$, $SE = 0.00$, $p < 0.05$, odds ratio [OR] = 1.01). Other positive factors are having a bequest motive, being a single male or in a partnership, income, and net worth. Hispanics, having kids, and being in poor health are negatively associated with saving. Having access to $3,000 is positively associated with saving, while those with short-term planning horizons (i.e., less than one year), intermediate-term planning horizons (i.e., two to nine years), and credit card debt are less likely to save.

A few differences exist in the secondary analysis. For those near retirement, RLE is not significant but RWLE is significantly and negatively associated with saving. As RWLE increases by one year for individuals near retirement, the odds of saving are about 12% lower

Table 4 Logistic regressions on the likelihood of saving, full sample of full-time workers, sample of those near retirement, and sample of those more than 10 years from retirement

	Full model (N = 2,632)				0–10 years (n = 617)				11+ years (n = 1,212)			
Variables (reference group)	*B*	SE. B	*p*	*OR*	*B*	SE. B	*p*	*OR*	*B*	SE. B	*p*	*OR*
Retirement life expectancy	0.01	(0.00)	0.014	1.01	−0.02	(0.01)	0.054	0.98	0.01	(0.01)	0.045	1.01
Remaining work life expectancy	0.01	(0.00)	0.159	1.01	−0.13	(0.03)	<.001	0.88	−0.02	(0.01)	0.093	0.98
Own's home	0.10	(0.10)	0.344	1.10	0.46	(0.29)	0.120	1.58	−0.11	(0.16)	0.480	0.89
Bequest motive	0.19	(0.08)	0.015	1.21	−0.01	(0.24)	0.959	0.99	0.02	(0.13)	0.894	1.02
Receive inheritance	−0.14	(0.12)	0.255	0.87	0.29	(0.33)	0.392	1.33	−0.03	(0.16)	0.840	0.97
Relationship status (married)												
Single male	0.37	(0.16)	0.017	1.45	1.33	(0.48)	0.006	3.77	0.10	(0.23)	0.676	1.10
Single female	−0.13	(0.13)	0.328	0.88	0.07	(0.35)	0.848	1.07	−0.34	(0.17)	0.043	0.71
Partner	0.28	(0.13)	0.030	1.32	0.92	(0.66)	0.161	2.50	0.16	(0.18)	0.379	1.17
Racial/ethnic status (White)												
Black	−0.13	(0.12)	0.302	0.88	−0.27	(0.34)	0.430	0.77	0.01	(0.18)	0.947	1.01
Hispanic	−0.34	(0.11)	0.002	0.71	−0.26	(0.45)	0.558	0.77	−0.45	(0.19)	0.018	0.64
Other	0.04	(0.18)	0.818	1.04	−0.89	(0.40)	0.027	0.41	0.35	(0.26)	0.177	1.42
Education (no high school diploma)												
High school	−0.09	(0.18)	0.622	0.92	0.47	(0.47)	0.318	1.59	−0.28	(0.33)	0.397	0.76
Some college	−0.11	(0.21)	0.607	0.90	0.50	(0.47)	0.287	1.64	−0.41	(0.37)	0.272	0.67
Bachelor's	0.34	(0.21)	0.110	1.40	1.34	(0.52)	0.010	3.84	0.08	(0.38)	0.827	1.09
Graduate	0.27	(0.22)	0.220	1.31	1.00	(0.55)	0.067	2.72	0.37	(0.40)	0.360	1.45
Log of income	0.48	(0.09)	<.001	1.61	0.65	(0.19)	0.001	1.91	0.55	(0.13)	<.001	1.73
Log of net worth	0.04	(0.01)	<.001	1.04	0.02	(0.03)	0.513	1.02	0.05	(0.02)	0.004	1.05
Have kids	−0.20	(0.03)	<.001	0.82	−0.27	(0.12)	0.026	0.77	−0.21	(0.05)	<.001	0.81
Perceived poor health	−0.30	(0.12)	0.010	0.74	−0.56	(0.31)	0.067	0.57	−0.56	(0.20)	0.005	0.57
Understand SCF questions? (good)												
Poor/fair	−0.22	(0.16)	0.171	0.81	−0.02	(0.52)	0.962	0.98	−0.02	(0.29)	0.952	0.98
Excellent	0.07	(0.08)	0.421	1.07	−0.22	(0.22)	0.319	0.80	−0.03	(0.13)	0.794	0.97
Having retirement plan	0.14	(0.09)	0.111	1.15	−0.23	(0.21)	0.268	0.79	0.37	(0.12)	0.002	1.45
Access to $3,000	0.27	(0.10)	0.008	1.31	0.13	(0.26)	0.621	1.14	0.16	(0.17)	0.351	1.17
Planning horizon (long)												
Short	−0.67	(0.15)	<.001	0.51	−1.17	(0.45)	0.010	0.31	−0.53	(0.22)	0.016	0.59
Intermediate	−0.46	(0.14)	0.001	0.63	−0.99	(0.37)	0.008	0.37	−0.30	(0.21)	0.152	0.74
Have credit card balance	−0.62	(0.07)	<.001	0.54	−1.13	(0.18)	<.001	0.32	−0.64	(0.11)	<.001	0.53
Constant	−4.80	(1.01)	<.001	0.01	−4.77	(2.25)	0.034	0.01	−5.06	(1.33)	<.001	0.01
Pseudo R^2	0.14				0.21				0.17			
Log likelihood	473.51				166.81				277.85			

Source: Weighted analysis of the 2013 Survey of Consumer Finances; RII technique and bootstrapping used.
Note: OR = odds ratio; analysis includes only those that are full-time, expect to retire, and have a retirement life expectancy greater than zero.

($B = -0.13$, $SE = 0.03$, $p < 0.001$, $OR = 0.88$). For individuals further from retirement, RLE is significant and positively associated with saving while RWLE did not have a significant effect.

4. Discussion

When breaking down subjective estimates of life expectancy into a retirement life expectancy period and a remaining work life expectancy period, there is confusing, contradictory, and ultimately very little influence on household consumption decisions. Retirement

life expectancy is not a significant predictor in our primary analysis of credit card debt. Additionally, RWLE is not a significant predictor in our primary analysis of credit card debt and whether or not a respondent saved. Even when separating individuals into those who are near and far from retirement, RLE is not significantly associated with financial assets, credit card debt, and savings behavior for those near retirement, and it is not significantly associated with credit card debt for those further from retirement. RWLE, on the other hand, is not significantly associated with financial assets and credit card debt for those near retirement, and is not associated with credit card debt and savings behavior for those further from retirement. RLE exhibits effect directions contrary to expectations in financial assets for both the primary and secondary analysis. Subjective life expectancy was only positively associated with saving behavior for those far from retirement.

Although the life cycle hypothesis suggests that life expectancy should influence household consumption choices, the behavioral life cycle model suggests that there may be other factors that prevent households from smoothing consumption according to the life cycle hypothesis. For example, even if a household realizes they may live longer, holding retirement age constant, they may lack the self-control or willpower to change consumption today to smooth consumption over the remainder of their lifetime.

The negative direction of the RLE factor on financial assets for the overall model may indicate what previous literature has found—U.S. consumers are not doing a good job at preparing for retirement (Aegon, 2016; Kim & Hanna, 2015b; Yuh, Montalto, & Hanna, 1998). Additionally, the fact that RLE and RWLE are not significant for those near retirement may show that people are not able to account for their life expectancy when making consumption choices. Alternatively, it could be that these households believe that, although retirement is salient, there is nothing they can do, so they do not factor in their RLE and RWLE when making consumption decisions related to their financial assets. Finally, because RLE is significant, but negatively associated with financial assets for those who plan to retire more than a decade from now, these individuals may be making consumption choices that are not in-line with the life cycle hypothesis. That is, there may be a self-control or willpower problem associated with their ability to properly plan for retirement.

4.1. Limitations

The most serious limitations center on measurement issues. Although the authors feel that the best available consumption measures in the SCF are chosen, the analysis would be improved with better measures of consumption. The saving measure is fairly limited as it is simply whether or not the respondent spent less than they made last year, and it assumes that the respondent actually knows whether or not they really did spend less than they made. Another limitation is that the secondary analysis age group restriction may be limited because of the fact that those in their mid-to-upper 30s, and even those in their mid-to-low 40s, are likely considerably different than those in their 50s and early 60s, regardless of RWLE. For example, someone that is 40 years of age with an RWLE of 10 may be quite different than a 55-year old with an RWLE of 10.

4.2. Implications

The results of this study have implications for professionals who help individuals and families plan for retirement, employers who offer retirement plans, and policymakers implementing legislation on retirement plans. Financial planners, financial counselors, and financial therapists have an important role to play in helping clients plan for retirement and/or make decisions around consumption choices that influence retirement preparedness. Given that it is likely that clients are not taking into account their life expectancy, particularly the amount of time they expect to spend in retirement, these professionals need to carefully help clients consider how their consumption choices impact their future financial resources available to them and how these choices may negatively influence their retirement lifestyle. Having conversations early and often, and holding clients responsible for their actions is of utmost importance. Professionals can help clients stick to the plan and illustrate the long-term impact of short-term consumption. This may help the client to think twice before making a choice that is detrimental to their financial assets available for retirement.

Second, these results may have meaningful impact for Human Resources directors and those who manage retirement plans. Given that we have shifted from a defined benefit (i.e., pensions) system to a defined contribution (i.e., 401(k)s) system, and that willpower and self-control may be an issue, incorporating programs that automatically opt-in employees to retirement plans, as well as automatically increase the employees' initial level of savings to some maximum reasonable percentage, may be a welcome adjustment. Previous research has found that this is a significant way to help increase employees' savings (Beshears, Choi, Laibson, & Madrian, 2009; Thaler & Benartzi, 2004). Although our results are not conclusive, the general lack of impact of life expectancy on consumption choices suggest there is a need for policies aimed at improving retirement preparation in the United States. If our result is explained by willpower and self-control problems, legislation requiring employers to, at minimum, automatically enroll their employees into defined contribution plans seem beneficial. According to Aegon (2016), three-quarters (76%) of respondents agreed on some level that the government should mandate employers to auto-enroll employees into the defined contribution plans.

This article contributes to the literature by showing that even if consumers are considering subjective life expectancy and their work life and retirement periods, they are doing a poor job. This may be due, in part, to self-control and willpower issues in delaying current consumption to provide consumption during retirement. The most likely explanation is that consumers do not consider their life expectancy and associated work and retirement periods when making consumption choices, resulting in a failure to adjust their consumption levels over the course of their life. Subsequently, this results in a lack of retirement preparedness for these individuals.

Notes

1 For example, using an 80% retirement income replacement rate for our sample's median income ($68,988) results in $55,190 in annual income needs during retirement.

Based on the median financial assets of our sample ($224,950), a 24.5% annual return would be needed to fund this retirement lifestyle in perpetuity ($55,190/$224,950). Alternatively, a portfolio of approximately $1 million would be needed to earn the amount necessary for retirement spending, given the assumptions above (based on a more realistic 5.5% annual return; $1M*.055 = $55,000). Hence, it is plausible that many households do not have the resources available to fund such a retirement income requirement, and that current financial asset income would not be sufficient to fund retirement income needs.

2 Spending relative to income (less, equal to, or more) in a multinomial logit was modeled. Results did not differ so the simpler (binary) model is presented.

References

Aegon. (2016). *A Retirement Wake-Up Call: The Aegon Retirement Readiness Survey 2016: United States Country Report*. Aegon: Center for Longevity and Retirement (available at http://www.aegon.com/Documents/aegon-com/Research/2016-Retirement-Survey/2016-Aegon-Retirement-Readiness-Report-USA.pdf).

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

Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2009). The importance of default options for retirement savings outcomes: Evidence from the United States. In J. R. Brown, J. B. Liebman, & D. A. Wise (Eds.), *Social Security Policy in a Changing Environment* (pp. 167–195). Chicago, IL: University of Chicago Press.

Bloom, D. E., Canning, D., & Graham, B. (2003). Longevity and life-cycle savings. *Scandinavian Journal of Economics, 105,* 319–338.

Bloom, D. E., Canning, D., & Moore, M. (2004). *Health, Longevity, and Optimal Retirement* (available at SSRN: http://dx.doi.org/10.2139/ssrn.594801).

Bloom, D. E., Canning D., Moore, M., & Song, Y. (2006). *The Effect of Subjective Survival Probabilities on Retirement and Wealth in the United States (No. 13688).* Cambridge, MA: National Bureau of Economic Research.

Deaton, A., & Paxson, C. (2000). Growth, demographic structure, and national savings in Taiwan. *Population and Development Review, 26,* 141–173.

Elder, T. E. (2007). *Subjective survival probabilities in the health and retirement study: Systematic biases and predictive validity*. Working Paper 2007–159, University of Michigan, Michigan Retirement Research Center.

Gupta, A., & Li, Z. (2013). Optimal annuity purchase decisions under uncertain lifetime. *Journal of Family Economic Issues, 34,* 447–459. doi:10.1007/s10834–012-9340–1

Hamermesh, D. (1985). Expectations, life expectancy, and economic behavior. *Quarterly Journal of Economics, 100,* 389–408.

Hurd, M. D., & McGarry, K. (2002). The predictive validity of subjective probabilities of survival. *Economic Journal, 112,* 966–985.

Kim, K. T., & Hanna, S. D. (2015). Does financial sophistication matter in retirement preparedness? *Journal of Personal Finance, 14,* 9–20.

Kim, K. T., & Hanna, S. D. (2015). Do U.S. households perceive their retirement preparedness realistically? *Financial Services Review, 24,* 139–155.

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

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.

Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. The collected papers of Franco Modigliani (Vol. 6, pp. 3–45). Cambridge, MA: The MIT Press.

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

Montalto, C. P., & Sung, J. (1996). Multiple imputation in the 1992 survey of consumer finances. *Financial Counseling and Planning, 7,* 133–141.

Nielsen, R. B. (2015). *SCF complex sample specification for Stata*. Technical note. Department of Financial Planning Housing and Consumer Economics, University of Georgia, Athens, GA.

Nielsen, R. B., & Seay, M. C. (2014). Complex samples and regression-based inference: Considerations for consumer researchers. *The Journal of Consumer Affairs, 48,* 603–619. doi:10.1111/joca.12038.

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

Shin, S. H., & Hanna, S. D. (2016). Accounting for complex sample designs in analysis of the survey of consumer finances. *The Journal of Consumer Affairs,* 1–15. doi:10.1111/joca.12106.

Spaenjers, C., & Spira, S. M. (2015). Subjective life horizon and portfolio choice. *Journal of Economic Behavior & Organization, 116,* 94–106.

Statista (2016). *Media advertising spending in the United States from 2011 to 2018* (in billion U.S. dollars; available at https://www.statista.com/statistics/272314/advertising-spending-in-the-us/).

Thaler, R. H. & Benartzi, S. (2004). Save more tomorrow: Using behavioral economics to increase employee saving. *Journal of Political Economy, 112,* S164–S187.

Tsai, I-J., Chu, C. Y. C., & Chung, C-F. (2000). Demographic transition and household saving in Taiwan. *Population and Development Review, 26,* 174–193.

Tversky, A., & Kahneman, D. (1974). Judgement under uncertainty: Heuristics and biases. *Science, 185,* 1124–1131.

Yuh, Y., & Hanna, S. D. (2010). Which households think they save? *The Journal of Consumer Affairs, 44,* 70–97.

Yuh, Y., Montalto, C. P., & Hanna, S. D. (1998). Are Americans prepared for retirement? *Financial Counseling and Planning, 9,* 1–13.