The Effect of Self-Control Mechanisms on Household Saving Behavior

Jong-Youn Rha, Catherine P. Montalto, and Sherman D. Hanna

The Survey of Consumer Finances was used to assess the explanatory power of self-control mechanisms, controlling for other important constructs from the standard life cycle model of saving. The analysis focused on saving goals, foreseeable expenses, and saving rules as mechanisms of self-control. Household saving behavior was strongly affected by mechanisms that help households practice self-control. Households that had saving rules were much more likely to spend less than income than those that did not have saving rules.

Key Words: behavioral life cycle hypothesis, life cycle hypothesis, saving behavior, self-control, Survey of Consumer Finances

Introduction

The personal savings rate in the United States has decreased drastically in the last decade from rates that were consistently above 7% in the 1960s, 1970s, and 1980s to very low rates in the 1990s and even a negative rate in 2005 (see Figure 1). Although the measure of personal savings used by the Bureau of Economic Analysis has been criticized for ignoring capital gains from investment and thereby distorting the picture of the wealth of U.S. households (Munnel, Golub-Sass, & Varani, 2005; Peach & Steindel, 2000; Swanson, 2001), the decrease in the personal savings rate nonetheless raises concerns among researchers and practitioners related to the adequacy of retirement savings and of emergency funds. Munnell et al. (2005) pointed out that personal saving will become increasingly necessary for retirement security. The need to understand the mechanisms behind people's decisions to save is of utmost importance.

In his seminal book, *Psychological Economics*, Katona (1975) emphasized the importance of psychological factors in economic decision making. Among other psychological variables, self-control is a concept that has been considered in economic psychology as an important factor in explaining saving behavior (Warneryd, 1989). In his qualitative study of savings, Lunt (1996) suggested that,

in the economic environment with higher materialism and more opportunities that are accompanied by risks, more importance should be placed on self-control. However, there are few studies that incorporated the concept into empirical analysis of household saving behavior, especially those using a data set that represents a national sample. The purposes of this study were to investigate differences in profiles of savers and non-savers and to identify the factors related to U.S. households' saving behavior with an emphasis on self-control mechanisms, including saving goals, anticipation of future expenses, and saving rules. The Survey of Consumer Finances (SCF) was used to assess the explanatory power of self-control mechanisms, controlling for other important constructs from the standard life cycle model of saving.
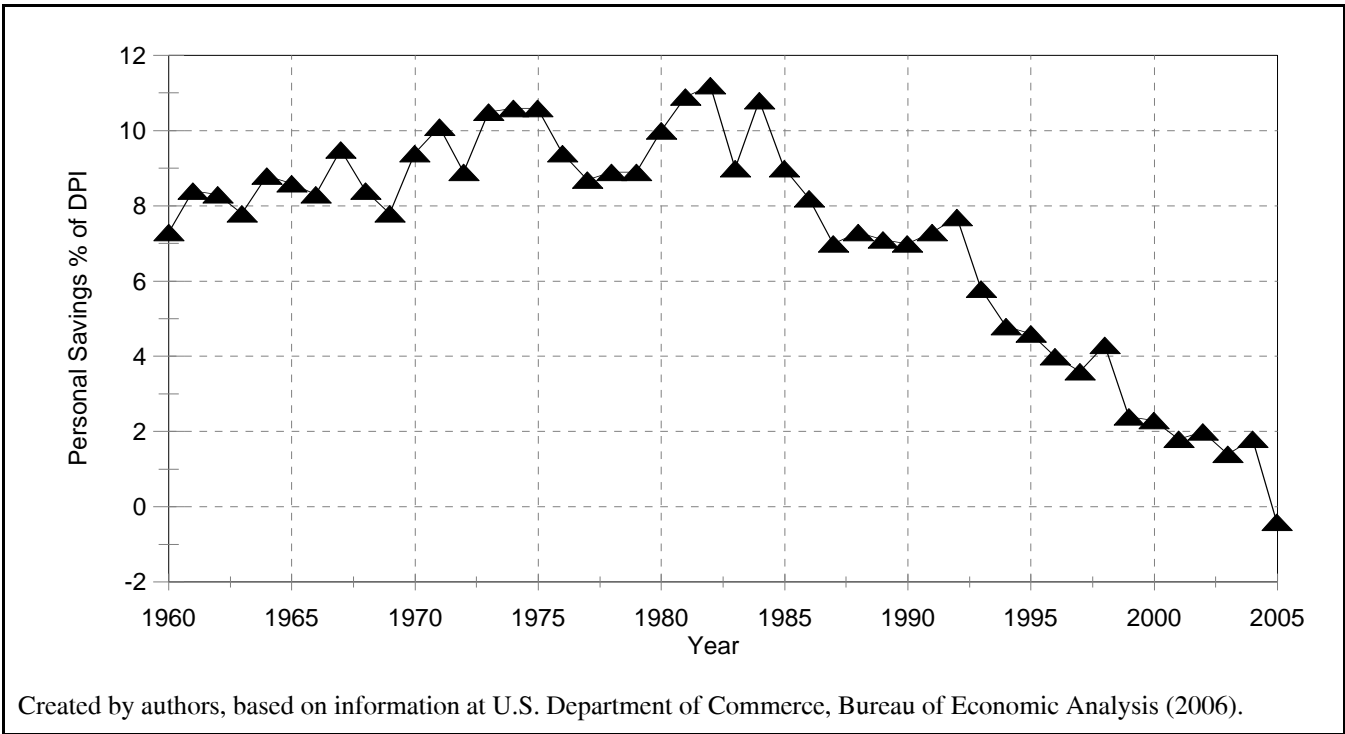
Theoretical Framework
Life Cycle Hypothesis
The life cycle hypothesis of intertemporal consumption, first introduced by Modigliani and Brumberg (1954) to explain aggregate consumption and saving, is still widely used to study the saving behavior of individual households. According to this theory, consumers maximize utility by choosing the optimal consumption level given their preferences and the resources available both now and in the future. The optimal savings level is then determined

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Figure 1. Personal Savings as a Percent of Disposable Personal Income, 1960-2005

Created by authors, based on information at U.S. Department of Commerce, Bureau of Economic Analysis (2006).

by the optimal consumption pattern. Although some empirical studies have produced results consistent with the theory, others have not. This lack of consistent empirical support for the theory has often been attributed to "unrealistic" assumptions made in the life cycle model. Attempts have been made to relax these assumptions, for example, by introducing the household as the decision-making unit (Xiao, 1996) or by introducing uncertainty (Chang, 1994).

The "rational" version of the life cycle savings model has become more complex in the past 20 years. Hanna, Chang, and Fan (1995) presented a prescriptive model of life cycle saving in which household saving decisions are determined by expected real income patterns, changes in household size, real interest rates, and household preferences. If households are rational, saving decisions are determined by objective factors and each household's time preference, although uncertainty is also important.

Empirical analyses of household saving have confirmed that wealth, income, socio-demographic factors, and uncertainty are important factors associated with household saving. The life cycle hypothesis posits that, all else equal, wealth should have a negative effect on household saving. However, Hefferan (1982) found a positive relationship

between wealth and the decision to save using the 1972-73 Consumer Expenditure Survey. Hefferan also found a positive relationship between income and the decision to save. Chang (1994) found income to be positively associated with increases in household net worth. In an ideal world with perfect certainty and perfect labor and financial markets, pension income and savings would be perfect substitutes, and a linear negative relationship between pension income and savings would be expected. However, due to uncertainty associated with future pension benefits, the effect of pension income on household saving is more complicated than hypothesized (Chen, 1997).

Social-demographic variables related to saving decisions include age, education, and household composition. The life cycle hypothesis posits that households accumulate wealth by saving during their working years when income is high and then dissaving in retirement (Modigliani & Brumberg, 1954). However, Avery and Kennickell (1991) found that elderly households did not dissave as much as predicted by the life cycle hypothesis and suggested that this may be due to uncertainty with respect to life expectancy or to bequest motives. The effect of education on saving is also complicated. Because educational attainment is a strong determinant of future earnings, people with higher levels of education may save relatively less due to

the expectation of higher future income. However, Solomon (1975) found positive relationships between educational attainment of the head of the household and the average and marginal propensities to save. He suggested that educational attainment is related to the subjective rate of time preference, with higher education signaling more future oriented individuals. Household composition affects the households' preferences and budget constraint and thus is closely related to household consumption patterns. As a result, household composition and saving should be related. Empirical studies indicated that married couple households save more than other types of households (Avery & Kennickell, 1991; Chang, 1994). Hanna and Rha (2000) suggested that household size and presence of dependent children would affect household saving decisions. Douthitt and Fedyk (1989) provided empirical evidence that families saved less in order to meet childrearing costs.

Behavioral Life Cycle Hypothesis
Although the life cycle theory is a theory that is popularly used by economists to explain saving behaviors, some economic psychologists have argued that the theory is inadequate. Life cycle theory has been criticized for failing to incorporate psychological concepts, such as thriftiness and refraining from consumption (Warneryd, 1989). The behavioral life cycle hypothesis (BLC), first proposed by Shefrin and Thaler (1988), incorporates three important behavioral features that they claimed were missing in the economic analyses of household saving: self-control, mental accounting, and framing.

In this paper, we focused on the role of self-control. The BLC assumes that "self-control is costly, and that economic agents will use various devices, such as pension plans, to deal with the difficulties of postponing a significant portion of their consumption until retirement" (Shefrin & Thaler, 1988, p. 610). Shefrin and Thaler proposed a dual preference framework in which both *planner* (long term) and *doer* (short term) preferences exist within a person. Because the will power to save is costly, the planner may seek techniques for achieving self-control, which include having rules and mental accounts. The idea of having saving rules is consistent with earlier thoughts of Strotz (1956), who proposed that people use external mechanisms, such as precommitment, to impose self-control. The notion of self-control has been adopted in the study of consumption-saving decision problems by many researchers (Benhabib & Bisin, 2005; Bernheim, Ray, & Yeltekin, 1999; Choi, Laibson, Madrian, & Metrick, 2005; Gul & Pesendorfer, 2001, 2004; Otto, Davies, & Charter,

2006). These researchers proposed models that explicitly incorporate behavioral constructs associated with saving/consumption decisions. For example, Gul and Pesendorfer (2001, 2004) stated that it is due to temptation, not dynamic inconsistency, that people prefer to make commitments and that economic agents use self-control to resist such temptations.

Possessing mental accounts of saving was also mentioned by Katona (1975) who suggested that saving can be distinguished based on reasons or motives. Although advocates of the BLC argue that behavioral variables such as self-control and mental accounts should be included in models of saving behavior, few empirical studies have been undertaken. The lack of empirical studies may be due to the lack of nationally representative data sets that include good information on both household financial information and these important behavioral variables.

The simplistic model of the BLC first suggested by Shefrin and Thaler (1988) posited three mental accounts: current income, current wealth, and future wealth. However, they acknowledged that "in general a more realistic model would break up the current wealth account into a series of sub accounts, appropriately labeled" (p. 615). We investigated whether different types of saving goals might represent the "sub accounts" proposed by Sefrin and Thaler. Saving goals could be empirically measured with a single binary variable indicating presence of saving goals; a significant positive result would be consistent with the self-control explanation proposed by the BLC. Alternatively, several indicator variables could be used to indicate presence of various types of saving goals. If different saving goals have different effects on household saving, this might suggest variation in the importance of competing saving goals and may be consistent with the existence of mental accounts and sub accounts.

Methodology
Data
The SCF is a triennial survey conducted by the Board of Governors of the Federal Reserve System. The survey was designed to provide detailed information on assets and liabilities of U.S. households, as well as their use of financial services. Of particular interest in this research was the information collected on the usual relationship between household spending and income, household saving goals and behavior, and household demographic characteristics. Data from the 1998 SCF were analyzed for this study and included information from 4,305 households, which,

appropriately weighted, can be used to generate estimates that are representative of the 102.6 million households in the U.S. in 1998. The percent of families reporting the use of typical saving habits, reasons or motives important for their saving, and the ability to spend less than their income in the previous year were very stable over the 1998, 2001, and 2004 SCFs (Bucks, Kennickell, & Moore, 2006). Analysis of the 1998 survey data set provides insights into saving behavior near the end of a long period of increasing prosperity, before stock market crashes of 1999-2002, the shock of September 11, 2001, and anxiety about terrorism.

Since 1992, the SCF has asked respondents directly whether the family's spending was less than, more than, or about equal to its income. When spending is less than income, there is a potential for saving (see Kennickell, 1995 for a discussion of strengths and weaknesses of this measure of saving). The availability of this direct question about recent saving behavior, combined with specific psychological and attitudinal questions related to financial behavior, made the SCF the most appropriate choice for this research.

Measurement of Variables
The dependent variable was constructed from the answer to the question "Over the past year, would you say that your spending (excluding spending on investments and durables) exceeded your income, was about the same as your income, or that you spent less than your income?" A binary variable was coded as 1 if the respondent reported that spending (excluding spending on investments and durables) was less than income and coded as 0 otherwise. The dependent variable was thus an indicator of the potential for saving. Following Kennickell (1995), we used this variable to estimate the probability of saving over the past year.

The independent variables were selected to capture important constructs of both the life cycle hypothesis and the BLC. The life cycle hypothesis posits that consumption and saving decisions are determined by household financial and social-demographic characteristics. The BLC posits that psychological variables, such as self-control, should also be included when modeling saving behavior.

Household financial variables included financial assets, non-financial assets, consumer debt, and the perceived adequacy of pension income. The amount of financial assets was measured as a continuous variable using the net worth code provided in the SCF codebook (Kennickell,

2000). Because the home is the primary non-financial asset of U.S. households, home ownership was used to proxy access to non-financial assets. The binary variable was equal to 1 if the home was owned either with or without a mortgage and equal to 0 otherwise. Consumer debt included credit card debt, installment loans, other lines of credit, and other miscellaneous debt. Consumer debt was coded as 1 if consumer debt was positive and coded as 0 otherwise. Perceived pension adequacy was coded as 1 if the respondent expected to have enough pension income to maintain living standards during retirement and coded as 0 otherwise. Household annual income was measured as a categorical variable to allow for a nonlinear relationship between income and saving. The reference category was income less than $10,000. The remaining categories were $10,000 to $24,999; $25,000 to $49,999; $50,000 to $99,999; and $100,000 or more.

Social-demographic variables included number of years until retirement, age and education level of the head, race/ethnicity of the respondent, and household composition. The number of years until retirement was coded as the actual number of years until the head expected to retire from the labor force, with a value of 0 for heads not currently in the labor force, or the number of years until age 80 for heads who reported that they did not expect to retire. Age and education of the head and race/ethnicity of the respondent were measured as categorical variables. Information on marital status and presence of dependent children in the household were used to classify households into one of eight household types (see Table 1).

Other variables that were important constructs in the theoretical life cycle model included expectations about future income, expectations about future interest rates, the personal discount factor, and the level of risk aversion. The SCF asked specific questions concerning expectations about future family income and future interest rates. Questions concerning the planning horizon and willingness to take risk were used to proxy the personal discount factor and the level of risk tolerance, respectively. These variables were all coded as categorical variables (see Table 1).

BLC variables included specific saving goals, foreseeing future expenses, and saving rules as proxies for self-control mechanisms. The respondents were allowed to identify up to 6 reasons that were important for their families' saving. A total of 29 reasons were reported. For the empirical analysis, the saving goals reported most frequently by households were used. The saving goals

Table 1. Descriptive Characteristics of Sample

Variables	Total	Savers (55.9%)	Non-savers (44.1%)
Demographic characteristics			
Number of years until retirement (*M*)	18.8	19.1	18.5
	%	*%*	*%*
Age*			
Under 35	23.3	22.1	24.8
35 to 44	23.3	23.9	22.5
45 to 54	19.2	19.9	18.4
55 to 64	12.8	14.0	11.4
65 or over	21.4	20.2	23.0
Education**			
Less than high school	16.5	11.7	22.6
High school degree	31.9	30.7	33.4
Some college	24.6	25.5	23.6
College degree	15.6	17.8	12.8
Advanced degree	11.4	14.4	7.6
Race/ethnicity**			
White	77.7	83.2	70.8
Black	11.9	7.8	17.0
Hispanic	7.2	5.8	9.0
Others	3.2	3.2	3.2
Household type**			
Married with children	25.0	27.0	22.5
Married no children	27.0	32.1	20.7
Living with a partner with children	2.7	2.4	3.1
Living with a partner no children	3.7	3.5	4.0
Single female with children	6.4	3.8	9.8
Single female no children	20.8	17.3	25.2
Single male with children	1.2	1.1	1.4
Single male no children	13.1	12.9	13.3
BLC variables			
Have saving goals			
Retirement**	45.3	54.2	34.1
Precautionary	32.6	33.5	31.6
Children	20.1	20.1	20.0
Purchase	19.3	18.5	20.2
Future/own education	17.2	16.6	18.1
Foreseeable major expenses	50.9	51.6	50.0
Have saving rules**	45.8	60.8	26.9

Table 1 (continued).

Variables	Total	Savers (55.9%)	Non-savers (44.1%)
Financial characteristics			
Financial assets (*M*)**	$132,756	$193,736	$55,562
	%	*%*	*%*
Home ownership**	66.3	73.8	56.7
Consumer debt	63.7	63.3	64.3
Perceived pension adequacy**	47.6	53.6	40.0
Household 1997 income**			
Less than $10,000	12.7	6.9	20.1
$10,000 to $24,999	24.6	17.7	33.4
$25,000 to $49,999	28.9	30.6	26.9
$50,000 to $99,999	25.1	32.3	16.1
$100,000 or more	8.5	12.5	3.5
Expectation variables			
Expect income increase**	23.5	25.6	20.9
Expect interest increase	64.3	64.9	63.6
Planning horizon**			
Next few months	19.5	13.8	26.8
Next year	13.8	12.1	16.0
Next few years	28.6	28.7	28.6
Next 5 years	23.1	26.0	19.3
Longer than 10 years	15.0	19.4	9.3
Willingness to take risk**			
Substantial risk	4.9	5.5	4.2
Above average risk	17.9	22.0	12.6
Average risk	38.5	26.0	33.3
No risk	38.8	19.4	49.9

Note. Calculated by authors based on weighted analysis of all five implicates of the 1998 SCF. Tests for statistical differences between savers and non-savers were conducted using two sample *t* tests for continuous variables and chi-square tests for categorical variables. Descriptive statistics and tests for differences were calculated using the SCF final nonresponse adjusted sampling weight.
*$p < .01$. **$p < .001$.

were classified into five categories: retirement, precautionary, children, purchasing, and future/own education. Our analysis of saving goals in the 1998 SCF is shown in Appendix A. An indicator variable was coded as 1 if the respondent reported a foreseeable major expense in the

next 5 to 10 years and coded as 0 otherwise. Saving rules included (a) saving income of one family member and spending the other, (b) spending regular income and saving other income, and (c) saving regularly by putting money aside each month. Similarly, an indicator variable was coded as 1 if the respondent reported having saving rules and coded as 0 otherwise. Foreseeing expenses and having saving rules could be used as heuristic techniques by the households as means of exercising self-control.

Analysis
Means and frequencies for all independent variables were calculated for the entire sample and were weighted using the SCF final nonresponse adjusted sampling weights to produce nationally representative estimates. Because the dependent variable was dichotomous, an unweighted logistic regression analysis was used to examine the probability of saving. Kennickell and McManus (1993) and Montalto (1998) have discussed disadvantages of using the weight variable in multivariate analyses. The unweighted logistic regression was estimated on data pooled from the five implicates of the SCF.

Analysis of the pooled data does not explicitly take into account the variability in the data due to missing values. As a result, the standard errors of the coefficients may be underestimated which would result in upward bias in the tests of significance. Repeated-imputation inference (RII) techniques are generally recommended for analysis of multiply imputed data (Rubin, 1987). In practice, the variability introduced due to missing values is of significance when the dependent variable involves a financial quantity, but of little practical significance when the dependent variable does not involve a financial quantity. Because the dependent variable in this research did not involve a financial quantity, the results from analysis of the pooled data, which were essentially identical to the RII results, are reported to allow the same regression output to be used to test significance of individual coefficients as well as to construct the likelihood ratio tests for significance of sets of coefficients.

Logistic regression (logit) is useful for situations in which one wants to be able to predict the presence or absence of an outcome (in this study, saving) based on values of a set of predictor variables (SPSS, 2004). Logit coefficients can be used to calculate odds ratios for each independent variable in the model. For each categorical variable, the odds ratio indicated the ratio of the odds of saving for the given category relative to the reference category, controlling for other independent variables.

Results
Demographic Characteristics of Savers and Non-Savers
Approximately 56% of households in the 1998 SCF reported that spending was usually less than income, indicating the ability to save (see Table 1). (In the 2004 SCF, the percent of households reporting that spending was usually less than income was also 56%.) Almost 46% of all households had one or more saving rules. Of those who saved, 61% had saving rules, whereas only 27% of those who did not save had saving rules. Of those who had saving rules, 74% saved, whereas only 40% of those who did not have saving rules reported that spending was usually less than income (see Figure 2). Savers had much higher socioeconomic status, including higher income and education, than non-savers.
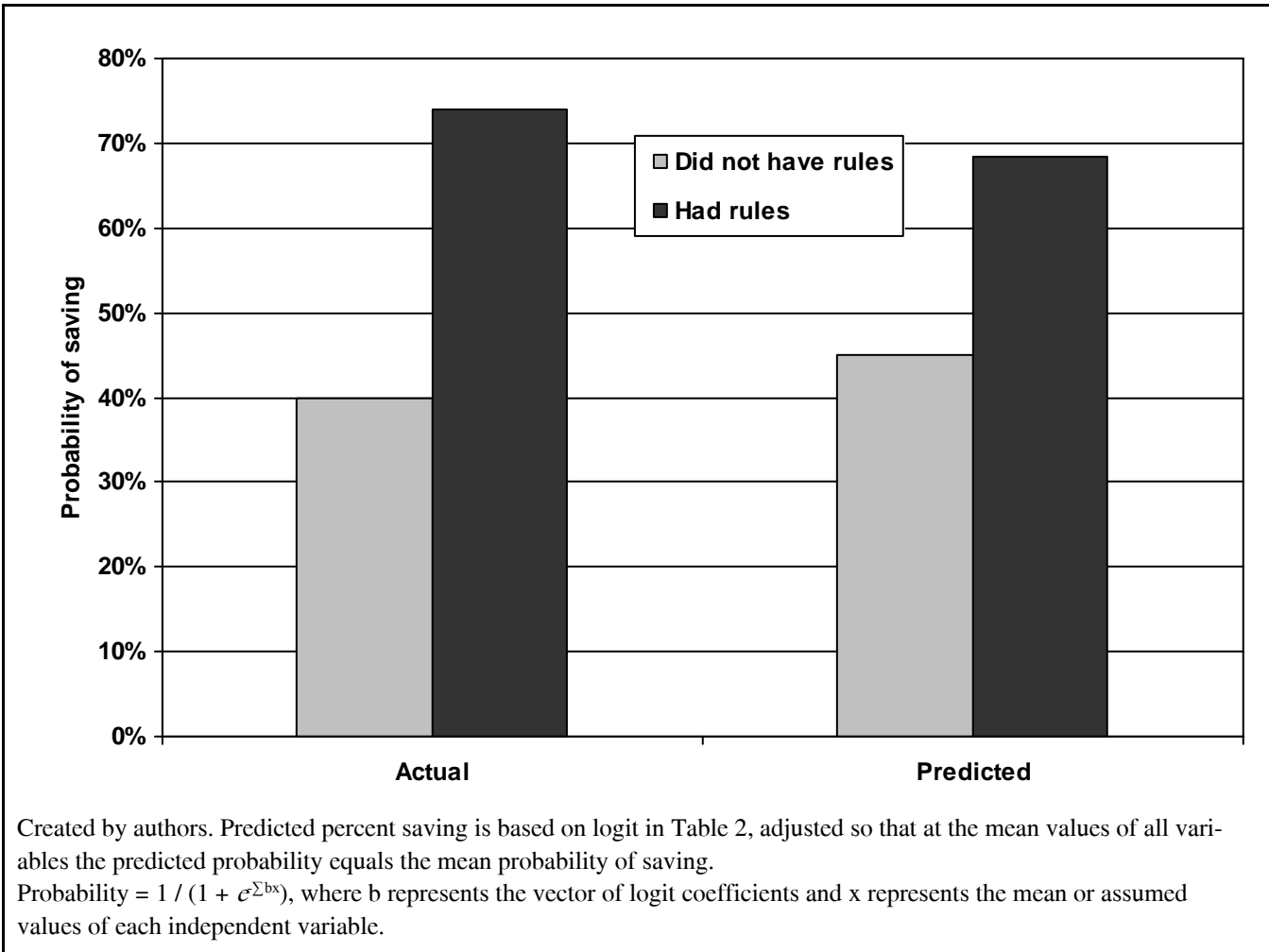
Logit Results
The chi-square statistic for the logit equation was statistically significant, and the pseudo R^2 (.3259) indicated an acceptable model fit. The concordance between the predicted probability of saving and the observed responses was 79.7%. The logit results indicated that after controlling for financial and demographic variables, BLC variables did affect the probability of saving (see Table 2). The BLC variable with the largest impact on saving was having saving rules. At the mean values of other variables, the predicted probability of saving was 68% for those having saving rules but only 45% for those who did not have saving rules (see Figure 2).

Four of the five saving goals were significantly related to the probability of saving, but the direction and magnitude of the effects varied by saving goal. Those reporting a retirement saving goal had predicted odds of saving 26% higher than similar households that did not report a retirement savings goal. Those who reported precautionary saving goals and purchase saving goals had predicted odds of saving 14% and 20% higher than households that did not report these goals. However, those who reported saving goals for the future or for one's own education had predicted odds of saving only 26% less than those who did not report either goal. Having foreseeable major expenses had only a small positive effect on saving.

Among financial variables, financial assets, home ownership, and perceived pension adequacy increased the probability of saving, whereas the presence of consumer debt

Figure 2. Percent of Households That Saved by Whether or Not Had Saving Rules

Created by authors. Predicted percent saving is based on logit in Table 2, adjusted so that at the mean values of all variables the predicted probability equals the mean probability of saving.

Probability = $1 / (1 + c^{\Sigma bx})$, where b represents the vector of logit coefficients and x represents the mean or assumed values of each independent variable.

decreased the probability. Household income had a strong positive impact on the probability of saving. Households with a college degree or an advanced degree were significantly less likely to save than otherwise similar households where the head had a high school degree. Households with Black respondents were less likely to save than otherwise comparable households with White respondents. Compared to households with unmarried male heads without children, households with unmarried heads and children, households with married heads and children, and households with unmarried female heads without children were less likely to save. The number of years until retirement did not have a significant effect on the probability of saving.

Other variables included expectations about income growth, expectations about future interest rates, the planning horizon, and the willingness to take risk. Households that expected household income to increase in the future

were more likely to save than households that did not expect income to increase. Longer planning horizons and the willingness to take risk both had positive effects on the probability of saving.

A likelihood ratio test was used to determine if the BLC variables added important explanatory power to the saving model. The results of logit analysis excluding the BLC variables are provided in Appendix B. (For the model comparison only the first implicate was used to obtain the test statistic in order to retain the true sample size.) The likelihood ratio test was used to statistically test the null hypothesis that the restricted model (the model excluding the behavioral variables) and the full model (the model including the behavioral variables) were equivalent (see Appendix C). Based on this test, the null hypothesis was rejected, indicating that the saving model including the BLC variables explained more variance in household saving behavior.

Table 2. Logit Analysis of Saving Decision in 1998 SCF, All Five Implicates, Unweighted

	Coefficient	STD error	Odds ratio
Intercept***	-1.0608	0.0954	
Demographic characteristics			
Number of years until retirement	0.00004	0.0007	
Age (reference category = under 35)			
35 to 44*	-0.1309	0.0533	0.877
45 to 54***	-0.2580	0.0571	0.773
55 to 64*	-0.1599	0.0682	0.852
65 or over*	-0.2287	0.0693	0.796
Education (reference category = high school degree)			
Less than high school	-0.0904	0.0558	0.914
Some college	-0.0608	0.0464	0.941
College degree**	-0.1696	0.0530	0.844
Advanced degree***	-0.1972	0.0464	0.941
Race/ethnicity (reference category = White)			
Black***	-0.5050	0.0568	0.603
Hispanic	-0.0949	0.0693	0.909
Others	-0.0008	0.0919	0.999
Household type (reference category = single male with no children)			
Married with children***	-0.4315	0.0637	0.650
Married no children*	-0.1290	0.0602	0.879
Living with a partner with children*	-0.2381	0.1164	0.788
Living with a partner no children***	-0.4656	0.0966	0.628
Single with children***	-0.6087	0.0795	0.544
Single female no children***	-0.2175	0.0616	0.804
BLC variables			
Have saving goals			
Retirement***	0.2308	0.0382	1.260
Precautionary***	0.1281	0.0371	1.137
Children	0.0472	0.0444	1.048
Purchase***	0.1799	0.0465	1.197
Future/own education***	-0.3044	0.0464	0.738
Foreseeable major expenses*	0.0855	0.0364	1.089
Have saving rules***	0.9585	0.0351	2.608
Financial variables			
Financial assets ($100,000)***	0.0037	0.0006	1.004
Home ownership***	0.1906	0.0442	1.210
Consumer debt***	-0.3890	0.0383	0.678
Perceived pension adequacy***	0.2566	0.0343	1.293
Household 1997 income (reference category = < $10,000)			
$10,000 to $24,999***	0.2319	0.0626	1.261
$25,000 to $49,999***	0.7544	0.0659	2.126
$50,000 to $99,999***	1.0686	0.0745	2.911
$100,000 or more***	1.7517	0.0860	5.764
Expectation variables			
Expect income increase***	0.3835	0.0403	1.467
Expect interest increase	0.0431	0.0348	1.044

Table 2 (continued). Logit Analysis of Saving Decision in 1998 SCF, All Five Implicates, Unweighted

	Coefficient	STD error	Odds ratio
Expectation variables			
Planning horizon (reference category = next few months)			
Next year***	0.2927	0.0594	1.340
Next few years***	0.4016	0.0501	1.494
Next 5 years***	0.4450	0.0533	1.561
Longer than 10 years***	0.6528	0.0612	1.921
Willingness to take risk (reference category = no risk)			
Substantial risk***	0.4806	0.0806	1.617
Above average risk***	0.3084	0.0527	1.361
Average risk***	0.2275	0.0533	1.255
-2 log likelihood	2281.455		
Percent concordance	79.7%		
Pseudo R^2	0.3259		

Note. Source: 1998 SCF (unweighted analysis of data pooled from all five implicates).
*$p < .05$. **$p < .01$. ***$p < .001$.

Summary and Discussion

The researchers investigated differences in financial and social-demographic characteristics between savers and non-savers and the effect of self-control mechanisms (i.e. saving goals, foreseeable expenses, and saving rules) on saving behavior as proposed by the BLC. Based on data from the SCF, approximately 56% of households reported that spending was usually less than income, indicating the ability to save.

The primary focus was to assess the explanatory power of selected constructs from the BLC, controlling for other important constructs from the standard life cycle model. The importance of the BLC variables as determinants of household saving was confirmed in the multivariate logit analysis. The results support the hypothesis that household saving behavior is positively affected by mechanisms that help households practice self-control. Households that use saving rules are much more likely to save than households that do not use saving rules. Having specific saving goals, such as retirement, generally increases the probability of saving, but the magnitude of the effect varies by saving goal. Having foreseeable expenses has a small positive effect on the probability of saving. These results are consistent with the finding of Hogarth and Anguelov (2003) in that having a reason or a motivation for saving was the most important determinant in increasing the likelihood of saving among the poor. The importance of these behavioral variables in explaining household saving behavior was confirmed by a likelihood ratio test. The inclusion of

the BLC variables improves the explanatory power of the model significantly.

Our multivariate analysis models the probability of saving. More specifically, the analysis models the probability that household spending was less than household income last year. In the multivariate results, when household income and the expectation of income growth are controlled, age has a nonlinear and negative effect on the probability of saving. Specifically, households with heads who are 45 to 54 years old are less likely than households with heads under age 35 to report saving last year. This finding may suggest that households begin saving early and have saving targets. As savings accumulate over time and households approach their saving target, those that meet or exceed their target may discontinue new contributions to savings. Alternatively, these results may suggest that there are important cohort differences in saving behavior. Cohorts who experienced relatively stronger wage growth or benefited from strong financial markets may have less incentive to save. Finally, the result is consistent with the fact that households with heads 45 to 54 years old are likely to have teen and college-age children who may be associated with increased spending.

As expected, both longer planning horizons and the willingness to take risk had positive effects on saving. Contrary to expectation, households that perceived their pension as adequate and households that expected income to increase were more likely to save than households who did

not. Financial variables (financial assets, home ownership, and household income) were positively related and consumer debt was negatively related to the probability of saving.

Limitations

The measure of saving analyzed in this research is a simple indicator for whether or not household spending was less than household income. This measure captures whether or not households perceived they were able to save. The empirical results reveal how each independent variable affects the probability of saving, controlling for the effects of all other variables included in the model. An equally important question focuses on the actual level or amount saved. A given variable need not have the same affect on the decision to save as on the amount saved, and the latter cannot be inferred from the results we have presented. Future research should explore the effect of behavioral variables on the saving amount.

The indicator of saving is constructed from self-reported information on the relationship between household spending and household income. As a result the measure of saving is subject to the error inherent in self-reported information, a misunderstanding of the question by respondents, or inaccurate information unknowingly or knowingly given by the respondent. Additionally, the question asked about the past year only; if the past year was unusual in any way, it may not accurately represent the typically saving behavior of the household. Having acknowledged these limitations, we believe that this indicator of saving provides sufficient information for investigating household saving behavior. Further, the richness of the SCF data, specifically the psychological and attitudinal questions related to financial behavior, enables us to analyze the effect of saving goals and expectations on household saving behavior.

Implications for Financial Planners, Counselors, and Educators

This research confirms that household saving behavior is positively affected by mechanisms that help households practice self-control. Having specific saving goals and using saving rules increase the probability of saving. Further, this positive effect occurs at low, moderate, and high levels of household income and financial assets. Financial planners can use this information to help client households build financial wealth. Financial counselors and financial educators can incorporate information on the importance of saving goals and saving rules into financial education programs and can develop strategies to help households adopt and implement appropriate financial behaviors.

This research provides a detailed summary of saving goals reported by U.S. households and a comparison of financial and demographic characteristics by specific saving goals. Financial planners can use this information to anticipate client needs, help clients fully explore motives for saving, and provide clients with more individualized saving instruments and comprehensive plans.

Financial counselors and financial educators can use the profiles of savers and non-savers to target education and outreach to populations that are likely to experience difficulty in saving. Programs that enable households to identify saving goals and that help households adopt and implement saving rules that are manageable and easy to follow will help these households build wealth. For example, households should be advised to identify clear saving goals and have separate savings accounts for each goal, which may make it easier for them to exercise self-control. Households should also be educated to identify saving rules that are appropriate for their situation, such as saving a certain portion of a second earner's income or a certain amount of household income to achieve certain saving goals. Personal involvement in identifying and implementing saving rules increases the likelihood that saving rules will be realistic and successful in increasing household saving.

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Percentage of Response by Types of Saving Goals in 1998 SCF, All Five Implicates, Weighted

Saving goal	1st reason	2nd reason	3rd reason	4th reason	5th reason	6th reason	Total
No response	.	51.44	84.14	96.73	99.51	100	
Don't save	4.94	.	.	.	.	.	4.94
Children's education	6.67	4.86	1.32	0.06	0.00	.	12.91
Own education	4.29	3.39	1.23	0.21	0.01	.	9.13
For children/family	3.93	2.50	1.02	0.24	0.00	.	7.69
Wedding/ceremonies	0.02	0.05	0.09	.	.	.	0.16
To have children	0.13	0.03	0.07	.	.	.	0.23
To move	0.16	0.02	0.02	.	.	.	0.20
House	4.37	2.49	0.97	0.25	.	.	8.08
Second home	0.05	0.05	0.03	.	.	.	0.13
Car, boat, or vehicle	1.12	1.45	0.77	0.17	0.03	.	3.54
Home repair	0.35	0.44	0.27	0.19	.	.	1.25
To travel	2.23	4.36	2.46	0.30	0.08	.	9.43
Durable	1.71	1.97	1.09	0.45	0.07	.	5.29
Burial	0.68	0.23	.	.	.	.	0.91
Charity/contribution	0.17	0.07	0.04	.	0.04	.	1.67
Enjoy life	0.30	0.33	0.28	0.03	.	.	.94
Buy own business	0.16	0.12	0.15	0.06	.	.	.49
Retirement	32.27	10.51	2.19	0.26	0.08	.	45.31
Unemployment reserve	0.95	0.94	0.24	0.06	.	.	2.19
Medical expenses	2.52	2.03	0.50	0.13	0.04	.	5.22
Emergencies	17.52	7.47	1.91	0.47	0.10	.	27.47
Investment	0.43	0.51	0.12	0.14	.	.	1.20
Commitment: debt	0.56	0.16	0.18	0.11	.	.	1.01
Get ahead	1.39	0.19	0.10	0.03	.	.	1.71
Living expenses	3.00	1.37	0.40	0.12	.	.	4.89
No reason	0.58	0.04	.	.	0.01	.	0.63
Future	7.75	2.16	0.31	.	.	.	10.22
Extra income	0.21	0.07	0.00	.	.	.	.28
Wise thing to do	0.48	0.31	0.00	0.00	0.02	.	.81
To have cash on hand	1.05	0.38	0.05	0.00	.	.	1.48

Appendix B
Logit Analysis of Saving Decision Without BLC Variables

	Coefficient	STD error	Odds ratio
Intercept***	-0.7894	0.0889	
Demographic characteristics			
Number of years until retirement	-0.0011	0.0006	0.999
Age (reference category: < 35)			
35 to 44**	-0.1602	0.0514	0.852
45 to 54***	-0.0324	0.0550	0.739
55 to 64***	-0.2181	0.0656	0.804
65 or over***	-0.3720	0.0670	0.689
Education (reference category: high school degree)			
Less than high school**	-0.1553	0.0544	0.856
Some college	0.0051	0.0451	1.005
College degree	-0.1000	0.0514	0.905
Advanced degree	-0.0919	0.0576	0.912
Race/ethnicity (reference category: White)			
Black***	-0.4553	0.0552	0.634
Hispanic	-0.1052	0.0676	0.900
Others	-0.0428	0.0899	0.958
Household type (reference category: single male with no children)			
Married with children***	-0.4164	0.0601	0.659
Married no children	-0.0538	0.0588	0.948
Living with a partner with children*	-0.2354	0.1129	0.790
Living with a partner no children***	-0.4164	0.0935	0.659
Single with children***	-0.6488	0.0768	0.523
Single female no children**	-0.1545	0.0598	0.857
Financial variables			
Financial assets ($100,000)***	0.0028	0.0005	1.003
Home ownership***	0.2347	0.0423	1.265
Consumer debt***	-0.4197	0.0372	0.657
Perceived pension adequacy***	0.3141	0.0333	1.369
Household 1997 income (reference category: < $10,000)			
$10,000 to $24,999***	0.3059	0.0613	1.358
$25,000 to $49,999***	0.9138	0.0642	2.494
$50,000 to $99,999***	1.3311	0.0723	3.785
$100,000 or more***	2.0106	0.0836	7.467
Expectation variables			
Expect income increase***	0.4307	0.0393	1.538
Expect interest increase	0.0399	0.0340	1.041
Planning horizon (reference category: next few months)			
Next year***	0.4756	0.0486	1.368
Next few years***	0.5690	0.0486	1.609
Next 5 years***	0.5690	0.0515	1.766
Longer than 10 years***	0.8220	0.0591	2.275
Willingness to take risk (reference category: no risk)			
Substantial risk***	0.5442	0.0784	1.723
Above average risk***	0.4147	0.0511	1.514
Average risk***	0.3034	0.0404	1.354
-2 log likelihood	23173.8		
Percent concordance	77.6%		
Pseudo R^2	0.2816		

Note. Source: 1998 SCF (unweighted analysis of data pooled from all five implicates).
*$p < .05$. **$p < .01$. ***$p < .001$.

Appendix C
Model Comparison Using Likelihood Ratio Test: Full Model With the BLC Variables vs. Restricted Model Without the BLC Variables

If the "added" explanatory variables are important, the log likelihood function of the full model should be larger than the log likelihood function of the restricted model (Greene, 1997).

    Let L_F = value of the likelihood function in the full model
        L_R = value of the likelihood function in the restricted model
    Likelihood ratio $l = L_R / L_F$
    Test statistic $-2 \ln l = -2 (\ln L_R - L_F) \sim c^2$
    Degree of freedom = $df_R - df_F$

In this study, -2 log likelihood for the full model with the BLC variables was 4486.456 ($df = 33$) and -2 log likelihood for the restricted model with the coefficients for the BLC variables set to zero was 4673.776 ($df = 40$).

    Test Statistic = 4673.776 - 4486.456 = 187.32 ($df = 7$, $N = 4305$, $p < 0.0001$)

Thus, the null hypothesis that the two equations are the same is rejected and the full model is preferred to the restricted model.