Prospect theory and saving behaviors during the Great Recession: 2009 SCF Panel Survey results

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ABSTRACT

The purpose of this research is to examine the contribution of prospect theory (Kahneman & Tversky, 1979) to our understanding of saving behaviors by U.S. households. In its most simple form, prospect theory suggests that people experience, or "feel", losses more acutely than they experience similar-sized gains. Prospect theory helps explain why consumers prefer insurance rebates over lower premiums, why gain-framed messaging impacts health decisions, and why investors hold on to declining stocks too long but sell winning shares too soon. Specifically, this research examines the asymmetrical response of households to gains and losses in current income, anticipated income, and asset values which occurred as a result of the global economic decline beginning in late 2007, and how that asymmetrical response impacts saving behaviors. This research further separates households that experienced decreases in wealth between 2007 and 2009 from those that experienced increases in wealth, and considers how that loss or gain frame further mediates household saving decisions. The results from the 2009 Panel Survey of Consumer Finances suggest asymmetrical responses consistent with the tenants of prospect theory exist. Further, prospect theory and other behavioral variables contribute significantly to predicting saving behaviors. The author concludes by discussing the practical importance of understanding the behavioral influences on savings behaviors during times of significant financial uncertainty.

Keywords: prospect theory, loss aversion, saving behaviors, Panel Survey of Consumer Finances, behavioral finance

INTRODUCTION

In the context of the global economic decline which began late in 2007, saving and investing decisions by U.S. families have heightened importance. The overall loss in household wealth between 2007 and 2009 is significant; and yet, any study of saving and investing behaviors must recognize that the Great Recession has both winners and losers with regard to changes in household wealth. While the overall wealth of U.S. households fell from a mean of $595,000 to $481,000 between 2007 and 2009, 37% of families did not experience a decline (Bricker, Bucks, Kennickell, Mach, & Moore, 2011). In fact, for those households whose wealth fell, the median decline was 45%; in comparison, for those households whose wealth increased, the median increase was 57% (Bricker et al., 2011).

This study examines how measures of loss aversion and prospect theory (Kahneman & Tversky, 1979) impact family decisions to save in the context of the global economic decline between 2007 and 2009. The differential impact of gains and losses on perceptions and decisions has been the subject of considerable study over the past several decades. Whether considering the impact of insurance rebates and deductibles (Johnson, Hershey, Meszaros & Kunreuther, 1993) or the importance of gain-framing health messages (Rothman & Salovey, 1997), the way in which losses are perceived differs from that of gains. Similarly, saving behavior has been the topic of considerable research over the past several decades (Fisher, 1930; Modigliani, 1986; Modigliani & Brumberg, 1954; Samuelson, 1937.) Research which applies behavioral concepts to saving and investing decisions has been a more recent advancement (Bowman, Minehart, & Rabin, 1999; Fisher & Montalto, 2010; Mitchell & Utkas, 2003; Rha, Montalto, & Hanna, 2006; Shefrin & Statman, 2000; Shefrin & Thaler, 1988, 1992). And, the application of loss aversion concepts of prospect theory to household saving decisions is just emerging (Fisher & Montalto, 2011). The focus of this paper expands upon the current understanding of how loss aversion impacts saving decision of U.S. households; specifically, this research expands the concept of loss frames beyond that of current income to include anticipated income and asset values, assesses the asymmetric impact of loss frames on saving behavior as compared to gain frames, and evaluates behavioral and prospect theory contributions to the prediction of saving behavior. Further analysis separates households that experienced wealth declines between 2007 and 2009 from those that experiences wealth increases, and considers how that loss or gain frame further mediates household saving decisions.

Insights from prospect theory (Kahneman & Tversky, 1979) and behavioral lifecycle saving theory (Shefrin & Thaler, 1988) are used to develop hypotheses regarding loss aversion and saving behavior while lifecycle theory of saving (Modigliani & Brumberg, 1954) is used to identify control variables for the saving model. Multiple logistic regression analysis is used to estimate the degree to which the variables predict saving behavior as well as the contribution of prospect theory variables on that saving behavior. A comparison of regressions is made between households with wealth declines between 2007 and 2009 and households with wealth increases over the same time period.

The 2009 Panel Survey of Consumer Finances is a follow-up re-interview of those families that responded to the 2007 Survey of Consumer Finances (SCF) and provides a unique glimpse at the impact of the economic recession on household financial behaviors and sentiments. Utilizing the survey results from the 2009 Panel survey, this study provides evidence of an asymmetrical response to increases in asset values and decreases in asset values. This study also provides evidence of an asymmetrical response to lower-than-reference versus higher-than-reference current income and anticipated income. Finally, this study provides evidence that

prospect theory and behavioral variables provide a significant contribution to predicting the likelihood of saving, particularly for households that have experienced a decline in wealth. Based upon these results, the author provides suggestions as to the theoretical contribution of prospect theory (Kahneman & Tversky, 1979) to our understanding of saving behaviors. The author also suggests the practical importance of understanding the behavioral influences on savings decisions.

REVIEW OF LITERATURE

The financial decisions made by the individuals and families that make up U.S. households are broad in number and type and have received considerable attention. From decisions on home purchases, mortgages, credit cards, and school loans, to choices of insurance, banking services, health services, and investments, consumer finance decision are important not only to the families that make them but also to the overall health and welfare of the population.

Within the array of financial decisions and behaviors made by households are those regarding savings. The act of saving is integrally woven with the act of consumption and represents the difference between income and current consumption (Browning & Lusardi, 1996). The intertemporal nature of saving, as described in neoclassical economic theory, suggests saving results as a tradeoff between current consumption and future consumption (Fisher, 1930; Samuelson, 1937). The lifecycle hypothesis of saving (Modigliani & Brumberg, 1954; Modigliani, 1986) provides a prescriptive model of saving for investors. Over an investor's life time, wealth is created during years of employment when income exceeds spending. That wealth is drawn down during years of retirement when spending exceeds income. The goal assumed by the lifecycle model is that households seek to maximize expected utility from consumption over their life time (Modigliani, 1986); and, thus, the goal of saving is to appropriately estimate spending needs in retirement, and assure that enough excess income is saved to fund that future consumption. Factors that impact current saving decisions include the present value of future consumption cash flows which, in turn, require the use of appropriate discount rates that include adjustments for inflation and uncertainty. Uncertainty in future income increases the discount rate as well as the demand for precautionary savings (Browning & Lusardi, 1996). Built into this prescriptive model of savings are the assumptions that assets are liquid, decision makers are rational, and that all wealth is fungible. In other words, consumption depends only on wealth, and not the source of wealth. With regard to loss aversion, the lifecycle model generally assumes an individual's response to good and bad news is symmetrical with regard to consumption decisions (Fisher & Montalto, 2011).

The behavioral lifecycle hypothesis, first proposed by Shefrin and Thaler (1988), challenges many of the rational assumptions upon which the lifecycle theory is based, and helps explain the behaviors often found surrounding saving decisions. Rather than assuming consumption is based on wealth alone, the behavioral theory suggests that the source of consumption impacts the amount of consumption. This link between source of wealth and consumption refutes the concept of wealth as fungible (Thaler, 1990). Specifically, the behavioral lifecycle hypothesis divides, or frames, wealth into a series of mental accounts: current income, current assets, and future income (Shefrin & Thaler, 1988). Further, the behavioral lifecycle hypothesis proposes that the propensity to consume out of the current income is greater than the propensity to consume out of current assets, and the propensity to consume out of current assets greater than the propensity to consume out of future income

(Shefrin & Thaler, 1988). Consumption is not merely an act of rational decision making directed at maximizing consumption utility; rather, consumption and saving decisions are influenced by non-rational factors such as the source of consumption and saving.

The primary purpose of this study is to examine the usefulness of prospect theory (Kahneman & Tversky, 1979) as a way to expand upon the existing scholarship related to saving behaviors. Prospect theory has provided significant insights to research across numerous disciplines. In its most simple form, prospect theory suggests that people experience, or "feel," losses more acutely than they experience similar-sized gains. Prospect theory helps explain why consumers prefer insurance rebates over lower premiums. Johnson et al. (1993) examined insurance rebates and deductibles and found that consumers placed a higher value on policies with rebates (gain frame) than policies with deductibles (loss frame) even though the consumers were economically worse off with the rebate policies. Prospect theory helps explain why gain-frame messaging influences health behaviors. Rothman and Salovey (1997) examined the impact of framing health recommendations as gains or losses, and found that the frame impacted subsequent client treatment decisions. Prospect theory also helps explain why investors take risks when losses are uncertain but settle for sure gains (Grable, 2008), resulting in holding on to declining stocks too long but selling winning shares too soon.

A full discussion of loss aversion requires examination of three required components (Kahneman & Tversky, 1979). First, according to prospect theory, losses and gains are experienced in relative, rather than absolute, terms and are, thus, reference dependent. Second, the pain of a loss is felt more than twice as heavily as the joy of a comparable gain. The combination of these first two components of loss aversion helps explain why people are more concerned about a loss of income or wealth compared to their reference point than happy with a gain of equivalent magnitude (Bowman et al., 1999; Camerer & Loewenstein, 2004). Third, under circumstances of some uncertainty, decision makers become risk seeking in the face of a loss and risk averse in the face of a gain (Camerer, 2000). In a situation where income has dropped temporarily below normal, loss aversion would lead to reduce savings (rather than reduced consumption) as a way to avert experiencing the loss. In these ways, loss aversion differs from mere risk aversion which posits, per classical economic theory, that uncertainty increases savings as a precautionary act (Browning & Lusardi, 1996; Guariglia, 2001).

Recently, Bowman et al. (1999) applied the concepts of prospect theory and loss aversion to consumption and saving decisions at an aggregate level. Based on national consumption and income data for Canada, France, West Germany, Japan, and the U.K., Bowman et al. (1999) was able to demonstrate an asymmetric response to lower-than-reference levels of income as compared to higher-than-reference levels. The resistance to decreased consumption in the face of bad news about future income was greater than the resistance to increased consumption in response to good news about future income.

Fisher and Montalto (2011) extended Bowman et al.'s (1999) work to household saving decisions. Conducting a study on the link between current income being higher-than or lower-than normal on saving behaviors, Fisher and Montalto (2011) found that the savings response to changes in income was not symmetrical. The resistance to lowering consumption in the face of lower-than-normal current income was greater than the resistance to increasing consumption in the face of higher-than-normal current income. These consumption reactions lead to larger saving declines in the first scenario than saving increases in the second scenario.

Framework

The focus of this current study is to expand on our current understanding of the contribution of prospect theory and loss aversion to saving behaviors by U.S. households. This study expands upon this earlier research in two ways. First, the notion of prospect theory and loss aversion will be expanded from current income to also include anticipated income and changes in asset values. Second, the contributions of prospect theory to the prediction of savings will be tested under the circumstances of wealth decreases and increases between 2007 and 2009. The expected relationships of prospect theory's loss aversion and the prediction of saving behaviors can be articulated with the following propositions.

> Proposition 1. An asymmetric response to changes in asset values, current income, and anticipated income on saving decisions will be consistent with prospect theory's loss aversion.
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> Proposition 2. Saving behavior can be predicted with measures of prospect and behavioral theories as well as measures of traditional lifecycle saving theory.
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> Proposition 3. The behavioral components of the saving model, including the measures of prospect theory, will be more impactful for those households that have experienced a recent loss of wealth.

Specific hypotheses are developed as part of the empirical model which tests these underlying assumptions.

DATA AND METHODOLOGY

Data Collection

Results from the 2009 Panel Survey of Consumer Finances were used for this research. The 2009 Panel survey is a follow-up re-interview of those families that responded to the 2007 Survey of Consumer Finance (SCF). Briefly, the SCF is a triennial, cross-sectional survey authorized by the Federal Reserve Board to collect survey data on assets, liabilities, income, demographics, and both psychological and financial attitudes of families in the U.S. The 2009 re-interview of the 2007 respondents was authorized by the Federal Reserve Board in response to the financial crisis which began in late-2007, and since referred to by many as the Great Recession. As such, the 2009 Panel survey, which contains pairs of interview responses for each respondent from both 2007 and 2009, provides evidence as to the consequences of the recent financial crisis and subsequent recession on the household sector of the U.S. economy (Bricker et al., 2011).

The sample design for the SCF is a dual-frame design including a multi-stage area probability sample and a list sample. The SCF employs a multiple imputation routine to estimate missing data. An analysis weight is computed for each case "accounting both for the systematic properties of the sample design and for differential patterns of nonresponse" (Bucks, Kennickell & Moore, 2006, p. A38). Combining the sample design, imputation routine, and weights, the

SCF provides sample measures that are consistent with measures for the U.S. population of families.

According to the lifecycle theory of saving, saving behaviors are anticipated to differ between individuals in their working (and "accumulating") years as compared to those who are in their retired (and "drawing down") years; consequently, households that included a retiree (either the respondent or the spouse/partner of the respondent where applicable) were excluded from further study. A total of 3857 respondents were included in the 2009 Panel data set. Of those, 3029 met the criteria of not having either the head of household or spouse/partner retired at the time of the 2009 survey. And, of the 3029 non-retired households, 1968 households experienced a decline in wealth from 2007 to 2009 while 1061 did not. Because one purpose of this study is to assess the impact of lost wealth on saving decision, respondents who experienced zero change in wealth were excluded from the wealth decline group.

Empirical Model

To measure the impact of changes in asset values on consumption, responses to two questions from the 2009 Panel survey are used. First, respondents are asked whether they are more likely to spend more money when the things they own increase in value. The five response options are recorded from agree strongly (5) to disagree strongly (1). Second, respondents are asked whether they are more likely to spend less money when the things they own decrease in value, with the response categories and coding mirroring the first question: agree strongly (5) to disagree strongly (1). Since these questions connect changes in consumption to changes in the value of things owned, the question presupposes that wealth is fungible. The expected associations based on Shefrin and Thaler's (1988) description of wealth "frames", and the preference for spending out of current income rather than out of asset values or future consumption, are set forth in the following hypothesis:

> H_1: Respondents are more likely to reduce spending when asset values decline than to increase spending when asset values increase.

To test whether asymmetry consistent with the tenants of loss aversion and prospect theory extend to the saving decisions of U.S. households, three additional hypotheses are developed. Saving is defined as spending less than income, and a dummy variable is used to indicate whether the respondent spent less than earned. Specifically, respondents are asked whether their spending, not including investing or capital expenditures, was less than, equal to, or more than the past year's income. Spending less than income is coded as 1. Respondents are asked to indicate whether this year's income is unusually high or low compared to what would be expected in a "normal" year. For the current study, "normal" is set as the reference category. Due to an asymmetrical resistance to decreasing consumption when income decreases (loss aversion), it is expected that in the face of some uncertainty about income, a current income below their respective reference will have a larger negative impact on savings than the positive impact on savings as a results of a current income above the reference (Kahneman & Tversky, 1979; Bowman et al, 1999; and Fisher & Montalto, 2011).

Beyond current income, respondents are also asked whether they expect their income over the next year to go up more than, less than, or the same as inflation. "Same as inflation" is set as the reference category. According to lifecycle theory, people would spend more if they

knew next year's earnings were going to be exceptionally good, and consume less if they knew earnings were going to be poor (Camerer, 2000; Shea, 1995). However, a study of teachers whose contracts were negotiated one year in advance showed news of a wage increase resulted in higher consumption; however, news of wage cuts did not result in lower consumption (Shea, 1995). Bowman et al. (1999) explain this insensitivity to bad income news as a combination of loss aversion to consuming below their reference point of consumption and willingness to gamble that the subsequent year's wages will not be so low.

These expected relationships between current and anticipated income as compared to their reference levels and impact on savings are captured in the following hypothesis:

> H_2: The likelihood of not saving when income is lower than the reference level will exceed the likelihood of saving when income is higher than the reference level.

As developed and described earlier, uncertainty is a key component in the asymmetrical response to gains and losses associated with prospect theory. In the face of an uncertain loss, decision makers become risk seeking, while in the face of a certain gain, decision makers become risk averse. In these ways, loss aversion differs from risk aversion which posits per classical economic theory that uncertainty increases savings as a precautionary act (Browning & Lusardi, 1996; Guariglia, 2001). A dummy variable is created to measure of income uncertainty. Respondents are asked whether they have a good idea of what their income would be next year. "No" is coded as 1. Combining these attributes of prospect theory with consumption/saving behavior, this model predicts:

> H_3: The likelihood of saving will decrease under circumstances of income uncertainty.

Further, since the framing concepts of Shefrin and Thaler (1988) predict consumption out of earnings before consumption out of assets, a family willing to consume gains in assets is expected to be even more willing to consume out of earnings. Thus, this model predicts:

> H_4: The likelihood of saving will decrease as respondents indicate a willingness to spend more money when the value of things they own increase.

To test whether prospect theory and other behavioral variables contribute significantly to predicting saving behaviors, additional measures associated with the behavioral lifecycle theory are added to the model. As described by Rha et al. (2006), the behavioral lifecycle hypothesis adds important psychological variables to those of the lifecycle theory, including framing, self-control heuristics, and mental accounting (Shefrin & Thaler, 1993; Thaler, 1990). In addition to the gain- and loss-frames recently described in this paper, the current research model incorporates variables for self-control and mental accounting. Saving rules or heuristics can represent one way to help savers assert self-control over spending (Rha et al., 2006; Strotz, 1956). For this study, a dummy variable is used to code whether the respondent uses a regular saving habit (either by saving regularly each month, by spending regular income and saving extra income, or by saving the income of one family member and spending the income of the other.) Further, the use of saving goals may represent the existence of mental accounts (Rha et al., 2006). For this study, respondents are asked what the most important reason would be for their family to save. Six saving frames or goals are included: saving for education, family, house,

retirement, liquidity, and investment purposes. Combined, measures of loss aversion, income uncertainty, wealth fungibility, saving heuristics, and mental accounting estimate the impact of the prospect and behavioral variables on the saving decision.

The remaining demographic and financial control variables expected to impact saving behavior and included in this study are established in theory and prior research (Fisher, 2010; Fisher & Hsu, 2012; Fisher & Montalto, 2010, 2011; Modigliani & Brumberg, 1954; Rha et al., 2006). Dummy variables are created for race/ethnicity (white non-Hispanic as reference), respondent's marital status (not married or living with partner set to zero), and homeownership (null set to zero). Continuous variables are used to control for age of the respondent, number of children in the household, number of years of education completed by the head of household, income, and net worth. Dummy variables for planning horizon (up to a year as short-term, a year to next five to 10 years as medium term, and over 10 years as long term, with long term set as reference category) and risk tolerance (no risk, average risks, above-average risks, and substantial risks, with no risk set as reference category) are also established. Finally, a dummy variable is created to identify respondents whose wealth declined or increased between 2007 and 2009. This change in wealth variable is used to split the overall sample into two subsamples. [See Kennickell (2000) for a full discussion of the definition of wealth used by the SCF.]

The full model is tested using logistic regression. Comparison of the relative impact of prospect and behavioral variables predicting the likelihood of saving between those with wealth declines and wealth increases is also made. Specifically, the overall model will be tested with the final hypothesis:

> H_5: Prospect and behavioral theory measures will provide a significant contribution to predicting the likelihood of saving.

Analysis

Point estimates and descriptive statistics of the independent variables are calculated using the SCF adjusted sampling weights. The application of SCF weights produces descriptive statistics that are generalizable to the U.S. population. Due to disadvantages in using weights in multivariate analyses with a dichotomous dependent variable (Rha et al., 2006), the unweighted responses are used for the multivariate logistical regression analysis. All five implicates were used for the current study. Since the SCF 2009 panel includes five full sets of responses for each respondent (based on the imputation process described earlier), repeated-imputation inference (RII) techniques (Montalto & Sung, 1996; Rubin, 1987) are used to estimate and adjust for the variability introduced by imputing the missing data. RII techniques were used to estimate both coefficients and estimates of variability for both the univariate and logistical regression analyses. Logistical regression can accommodate the dichotomous dependent variable in this research and will be used to test the overall model (Bohrnstedt & Knoke, 1994).

RESULTS

Descriptive statistics are displayed in Table 1 (Appendix) for the overall sample (N=3029) as well as for the group of households that experienced a decline in wealth (n=1968) and the group that experienced an increase in wealth (n=1061) between 2007 and 2009. Significant differences between the two groups are noted and were determined with t-test for

continuous variables and chi-square test for categorical variables. In 2009, just over half of the non-retired U.S. households (52%) reported saving over the last year. Over 70% of the respondents were white non-Hispanic, approximately 55% were married or living with a partner, and over 66% of respondents owned their home. On average, the respondents had just over one child living at home, were just over 45 years of age, had approximately 1.5 years of education beyond high school, a net worth of $410,544, and household income of $83,682. Most respondents (54%) indicated a medium planning horizon while "no risk" was the most common response (42%) to risk-taking preferences. Sixty-five percent of respondents indicated their current income was about normal, and 43% of respondents anticipated their income for next year would increase at about the rate of inflation. Respondents were more likely to reduce their spending when asset values decreased than increase their spending when asset values increased. Saving for cautionary or liquidity (35%) or retirement (31%) purposes were the two most common reasons given for saving. Sixty percent of respondents indicated a relative certainty as to future income, and 45% reported using a saving rule or heuristic.

Responses for the group that experienced a decline in wealth differed in several ways from responses for the group that experienced an increase in wealth. The group that experienced wealth decline saved at a lower rate, are more likely to be married or living with a partner, own their home, be older, have current income that is normal or lower than normal, be likely to spend more money when things they own increase in value, be less likely to have housing as a savings goal, and be less likely to use a saving rule or heuristic.

With regard to the test of prospect theory as it relates to asset values, a cross-tabulation with chi-square statistic was used to test the anticipated asymmetrical response to losses and gains in asset values. Table 2 (Appendix) reveals that the response to losses in asset value is greater than response to increases in asset value ($\chi^2 = 1185.9$, df = 4, p<.001). Respondents are more likely to reduce spending in the face of a loss than increase spending in the face of a gain. These results support H_1. This asymmetrical response holds for both households whose wealth declined ($\chi^2 = 760.7$, df = 4, p < .001) as well as for households whose wealth increased ($\chi^2 = 428.8$, df = 4, p<.001).

The logistical regressions on the entire sample (N=3029) was run in two blocks, with all five implicates, and no weights (Table 3) (Appendix). The standard error is computed using RII and the variable coefficients represent the pooled coefficients. Evaluation of the Variance Inflation Factor on the regression indicates no unacceptable collinearity (Allison, 1999). The overall regression equation has a chi-square statistics that is statistically significant. The pseudo-R^2 is .282 and the prediction accuracy is 71.7% indicating an acceptable model fit. The statistical significance of the equation parameters are provided, and the parameter estimates can be used to compute the odds ratios predicted by the model.

With regard to the test of prospect theory as it relates to current income, the impact of lower-than-normal income is disproportionately large on saving behavior compared to the impact of higher-than-normal income**.** The logistic regression creates odds ratios for each parameter Specifically, having lower than normal income decreases odds of saving by 37.1% (p<.001) while having higher than normal income increases the odds of saving by 7.1% but was not a statistically significant variable in the overall model. With regard to the test of prospect theory as it relates to anticipated income, the impact of anticipated income lower than inflation on saving behavior is disproportionately large compared to the impact of anticipated income higher than inflation. Specifically, anticipating income to be lower than inflation decreases the odds of saving by 26.4% (p<.01) while anticipating income higher than inflation increases the odds of

saving by 15.8%, but is not statistically significant. Combined, these results support the hypothesis (H_2) that losses associated with current and future consumption are felt more intensely than gains. Loss frames of current and anticipated income significantly decrease the likelihood of saving while neither gain frame significantly increases the likelihood of saving. With regard to the impact of income uncertainty on saving behavior, the logistic regression suggests having an uncertain income for the next year decrease the odds of saving by 30.1% ($p<.001$) (H_3). Also, willingness to spend more money when the value of assets increase negatively impacts the odds of saving by 10.6% ($p<.001$) (H_4). The two remaining measures of behavioral lifecycle theory, mental accounts and saving heuristics, both significantly impact the likelihood of saving. The mental accounts of saving for a house, retirement, or cautionary purposes increase the odds of saving by 78.5%, 52.2%, and 59.3%, respectively, compared to those that not report these saving goals. And, the use of a saving rule or heuristic increases the odds of saving by nearly 200%.

Several of the lifecycle control variables also entered the logistic regression as significant predictors of the likelihood of saving. Being married increases the odds of saving by 23.3%. Each year of education beyond high school increases the odds of saving by 4.6%. The "Other" category for race/ethnicity increases the odds of saving by 71.2%. Every additional $100,000 of income increases the odds of saving by 4.3%. And willingness to take average or above average risks increases the odds of saving by 42.6% and 32.5%, respectively. Every additional child in the household decreases the odds of saving by 7.2%. The Black race/ethnicity category decreases the likelihood of saving by 24.6%. And, having a short planning horizon decreases the likelihood of saving by 41.3%.

As mentioned earlier, the logistic regression was run in two blocks. The first block of variables entered into the regression were lifecycle variables while the second block contained prospect and behavioral variables. The improvement in model fit with the first block of variables is statistically significant (χ^2=340.445, df = 15, $p<.001$) resulting in a pseudo-R^2 of .169. The improvement in model fit with the second block is statistically significant (χ^2 = 306.236, df = 13, $p< .001$) resulting in a pseudo-R^2 of .282. These results support the hypothesis (H_5) that prospect and behavioral theory measures provide a significant contribution to predicting the likelihood of saving.

To examine the relative impact of prospect and behavioral variables on households that have experienced a recent loss of wealth, separate regressions have been run for households with wealth declines and with wealth increases. Table 4 (Appendix) contains the results of these regressions. For the subgroup that experienced wealth decline (n=1968), the overall model is statistically significant with prediction accuracy of 70.9%. The contribution of the prospect and behavioral variables can be found in the improvement in model fit with addition of the second block of variables. The improvement in model fit with addition of the behavioral and prospect variables is statistically significant (χ^2 = 207.429, df = 13, $p<.001$) with pseudo-R^2 improving from .154 to .273. For the subgroup that experienced wealth increase (n = 1061), the overall model is statistically significant, with prediction accuracy of 74.7%. The contribution of the prospect and behavioral variables is statistically significant (χ^2 = 101.564, df = 13, $p<.001$) with pseudo-R^2 improving from .240 to .342. For both the households whose wealth declined and those whose wealth increased, prospect and behavioral variables provide important explanation in predicting the likelihood of saving behaviors. In comparing the regression results for these two subsamples, the contribution of the traditional lifecycle variables to pseudo-R^2 is larger for the wealth increase group (.240) than for the wealth decrease group (.154). The proportional

improvement in pseudo-R^2 due to prospect and behavioral factors is higher for the wealth decrease group (a 77.3% improvement in pseudo-R^2 compared to a 44.5% improvement).

Finally, looking at variables that impacted only those whose wealth declined, anticipated income below reference and income uncertainty both had negative impact on the odds of saving. Considering those variables that impacted only respondents whose wealth increased, having retirement and investment saving goals increased their odds of saving. Three prospect/behavioral variables impacted the odds of saving for both subgroups: current income below reference (negative impact), willingness to spend increases in asset values (negative impact) and, cautionary savings goal (positive impact).

DISCUSSION AND IMPLICATIONS

The results of this study confirm behavioral factors, and particularly loss aversion as developed through prospect theory, impact saving behaviors of U.S. households. Consistent with loss aversion and the concept of mental accounts of wealth, respondents are more likely to reduce spending if asset values decreased than increase spending if asset values increased. Both current income and anticipated income below reference levels have disproportionately large impacts on odds of saving as compared to income levels above their respective reference levels. This disparity between strong aversion to relative losses as compared to weaker desire for equivalent gains is entirely consistent with the concept of loss aversion and prospect theory (Camerer & Loewenstein, 2004).

The impact of the remaining behavioral and prospect theory variables on saving decisions can be considered individually as well as collectively. As anticipated, measures of loss aversion, income uncertainty, and wealth fungibility decrease the odds of saving while measures of mental accounting and decision heuristics increase the odds of saving. When considered together, the behavioral and prospect theory variables add significant additional prediction to the likelihood of saving beyond that of the lifecycle control variables.

In the end, the hypothesized associations of loss aversion on saving behaviors are supported. Specifically, this study extends current research of household saving behaviors, and confirms the anticipated asymmetrical response to changes in not only current income, but also in anticipated income and asset values. Importantly, at a time of continued global financial unrest, this study also adds to our understanding of the impact of behavioral influences on saving decisions when household wealth has decreased or increased. The results suggest that households recently impacted by a wealth decline are particularly influenced by behavioral and prospect factors when it comes to saving decisions.

Several suggestions can be offered for future studies. This research has demonstrates the impact of loss aversion on saving behaviors; future research may seek to further determine the factors which contribute to levels of loss aversion. Also, the perception of wealth as fungible, or not, has a large impact on saving and consuming behaviors; future research might explore predictors of that perception of wealth as fungible. As this research is focused on spending less than earned, it provides a measure of saving potential; future research might explore predictors of amounts saved. Future research would also benefit from a longitudinal research design of multiple time periods that allows for determining causal relationships.

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APPENDIX

Table 1. Descriptive Statistics of Non-retired Sample and Subsamples

	Total Sample	Wealth Decreased	Wealth Increased
Unweighted N	3,029	1,968	1,061
Saved***	51.5%	49.0%	55.7%
Race/Ethnicity			
White	70.5%	70.2%	71.2%
Black	14.2%	14.2%	14.2%
Hispanic	10.3%	10.5%	9.9%
Others	5.0%	5.1%	4.7%
Married**	54.7%	56.5%	51.6%
Number of children	1.04(.0226)	1.053(.0276)	1.017(.0391)
Home ownership***	66.5%	69.4%	61.6%
Age of respondent*	45.53(.2340)	45.99(.2841)	44.77(.4074)
Education of respondent	13.53(.0492)	13.56(.0618)	13.47(.0856)
Net Worth (in $million)	.410544(.0523)	.376196(.0544)	.467858(.1078)
Income (in $100,000)	.83682(.0420)	.83092(.0443)	.84665(.0857)
Planning horizon:			
Short: Up to a year	33.6%	33.5%	33.8%
Medium: Next 5-10 years	54.4%	54.5%	54.3%
Long: Over 10 years	11.9%	12.0%	11.9%
Willingness to take risk:			
Substantial	3.8%	3.7%	3.9%
Above average	13.0%	13.5%	12.2%
Average	40.8%	40.6%	41.1%
No risk	42.4%	42.2%	42.8%
Current income:			
High	10.2%	10.4%	9.8%
Low***	24.4%	26.4%	21.0%
Norm***	65.4%	63.1%	69.2%
Future income:			
Up more than inflation	18.5%	18.1%	19.0%
Up less than inflation	38.4%	39.0%	37.3%
About the same as inflation	43.2%	42.9%	43.8%
Spend the gain**			
Agree strongly	6.1%	6.5%	5.3%
Agree somewhat	19.0%	20.1%	17.1%
Neither	12.4%	12.3%	12.6%
Disagree somewhat	29.7%	27.5%	33.3%
Disagree strongly	32.8%	33.5%	31.6%
Average	2.358(.0233)	2.386(.0295)	2.312(.0377)
Save the loss			
Agree strongly	36.0%	37.6%	33.4
Agree somewhat	26.7%	26.2%	27.6
Neither	12.3%	11.5%	13.6

Disagree somewhat	14.0%	13.4%	14.9
Disagree strongly	11.0%	11.2%	10.5
Average	3.628(.0252)	3.655(.0314)	3.585(.0418)
Saving frame			
Education	11.8%	10.2%	13.5%
Family	4.9%	5.1%	4.5%
House**	4.7%	3.7%	6.3%
Retirement	30.5%	31.8%	28.4%
Cautionary/Liquidity	34.6%	34.9%	34.1%
Investments	1.0%	.7%	1.4%
Income uncertain	40.0%	40.4%	39.3%
Saving heuristic***	44.8%	41.7%	50.0%

Note: *p=<.05, **p=<.01, ***p=<.001. Means for continuous variables are weighted. Standard errors employ the RII technique. T-test was used for continuous variable tests of differences and chi-square for categorical variables.

Table 2. Percentage Response of Non-retired Sample and Subsamples

	All Non-retirees N=3029		Wealth Decreased n=1968		Wealth Increased N=1061	
	Spend Gain[a]	Save Loss[b]	Spend Gain[a]	Save Loss[b]	Spend Gain[a]	Save Loss[b]
Agree Strongly	6.1	36.0	6.5	37.6	5.3	33.4
Agree Somewhat	19.0	26.7	20.1	26.2	17.1	27.6
Neither	12.4	12.3	12.3	11.5	12.6	13.6
Disagree Somwht	29.7	14.0	27.5	13.4	33.3	14.9
Disagree Strongly	32.8	11.0	33.5	11.2	31.6	10.5
Mean	2.368	3.628	2.386	3.655	2.312	3.585
(SE)	(.011)	(.012)	(.017)	(.014)	(.017)	(.019)
χ^2 (4 df)	1185.9***		760.8***		428.8***	

[a] more likely to spend more money when the things owned increase in value
[b] more likely to spend less money when the things owned decrease in value
Note: ***p=<.001

Table 3. Logistic Regression of the Likelihood of Saving for Non-retirees, N=3029

Variables	B		S.E.	Odds Ratio
Race /Ethnicity (ref category = white)				
Black	-0.282	*	0.143	0.754
Hispanic	-0.088		0.167	0.915
Others	0.538	**	0.206	1.712
Married	0.209	*	0.096	1.233
Number of children	-0.075	*	0.037	0.928
Home ownership	0.131		0.114	1.14
Age of respondent	0.002		0.004	1.002
Education of Respondent	0.045	*	0.019	1.046
Net Worth (in $1,000,000)	0.003		0.003	1.003
Income (in $100,000)	0.042	***	0.01	1.043
Planning horizon (ref category > 10 years)				
Few months up to next year	-0.533	***	0.142	0.587
Next few years up to 5-10	-0.232		0.124	0.793
Willingness to take risks (ref category = no risks)				
Substantial risks	0.153		0.212	1.165
Above average risks	0.281	*	0.135	1.325
Average risks	0.355	***	0.102	1.426
Prospect and Behavioral Variables				
Current Income (ref category = normal)				
High	0.069		0.145	1.071
Low	-0.463	***	0.099	0.629
Future Income (ref category = same as inflation)				
Up more than	0.147		0.116	1.158
Up less than	-0.307	**	0.094	0.736
Spend the Gain	-0.112	***	0.032	0.894
Saving Frames				
Education	0.147		0.181	1.158
Family	0.159		0.226	1.173
House	0.58	*	0.258	1.785
Retirement	0.42	**	0.151	1.522
Cautionary	0.465	**	0.146	1.593
Investments	0.745		0.412	2.107
Income Uncertain	-0.358	***	0.088	0.699
Saving Heuristic	1.098	***	0.087	2.999
Constant	-0.866	*	0.376	0.42
-2 log likelihood	3419.29			
Percent concordance	71.70%			
Pseudo-R^2	0.282			

Note: *p=<.05, **p=<.01, ***p=<.001. Source: 2009 SCFP (unweighted analysis of data pooled from all five implicates).

Table 4. Logistic Regression of the Likelihood of Saving by Wealth Decreased (n=1968) and Wealth Increased (n=1061)

Variables	Wealth Decreased			Wealth Increased		
	B		Odds Ratio	B		Odds Ratio
Race /Ethnicity (ref category = white)						
Black	-0.096		0.909	-0.539	*	0.584
Hispanic	0.166		1.181	-0.57		0.565
Others	0.575	*	1.777	0.495		1.641
Married	0.296	*	1.345	0.063		1.065
Number of children	-0.074		0.929	-0.074		0.928
Home ownership	0.111		1.117	0.21		1.233
Age of respondent	0.009		1.009	-0.008		0.992
Education of Respondent	0.028		1.028	0.074	*	1.077
Net Worth (in $1,000,000)	0.002		1.002	0.003		1.003
Income (in $100,000)	0.034	**	1.035	0.111	**	1.117
Planning horizon (ref category > 10 years)						
Few months up to next year	-0.473	**	0.623	-0.604	*	0.547
Next few years up to 5-10	-0.243		0.784	-0.191		0.826
Willingness to take risks (ref category = no risks)						
Substantial risks	0.131		1.14	0.238		1.269
Above average risks	0.372	*	1.45	0.086		1.09
Average risks	0.364	**	1.439	0.359	*	1.432
Prospect and Behavioral Variables						
Current Income (ref category = normal)						
High	0.302		1.352	-0.336		0.715
Low	-0.37	**	0.691	-0.537	**	0.584
Future Income (ref category = same as inflation)						
Up more than	0.194		1.214	0.068		1.07
Up less than	-0.339	**	0.712	-0.258		0.772
Spend the Gain	-0.105	**	0.9	-0.133	*	0.876
Saving Frames						
Education	-0.002		0.998	0.391		1.479
Family	0.183		1.201	0.12		1.128
House	0.612		1.843	0.592		1.808
Retirement	0.354		1.425	0.58	*	1.787
Cautionary	0.426	*	1.532	0.593	*	2.81
Investments	-0.05		0.951	2.907	**	18.304
Income uncertain	-0.437	***	0.646	.-177		0.838
Saving Heuristic	1.103	***	3.014	1.112	***	3.039
Constant	-1.128	*	0.324	-0.689		0.502
-2 log likelihood	2259.5			1107.22		
Percent concordance	70.90%			74.70%		
Pseudo-R^2	0.273			0.342		

Note: *p<.05. **p<.01.***p<.001.Source: 2009 SCFP (unweighted analysis of data pooled from all five implicates).