

Do Inter-temporal Preferences Trump Financial Education Courses in Driving Borrowing and Payment Behavior?

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Abstract:

This paper examines the factors associated with risky money management behaviors, utilizing a uniquely rich survey dataset on college students. The data include a wide range of respondent characteristics and experiences during and prior to college that shape money management skills, attitudes and self-confidence. An important component of the data derives from carefully controlled incentivized choice experiments conducted by the authors to measure respondents' risk and time preferences. Both the subjects' degree of impatience (as measured across choices between deferred rewards) and their levels of risk tolerance turn out to have significant explanatory power in estimating several types of risk borrowing and money management behaviors.

1. Introduction

A number of studies have found that financial illiteracy (i.e., poor knowledge of concepts relevant to personal finances and money management) is associated, *ceteris paribus*, with risky financial behaviors. Consumers with less financial knowledge exhibit poor budgeting and money management habits (Hilgert, Hogarth and Beverly, 2003), plan and save less for retirement (Lusardi and Mitchell 2006, 2008), use higher cost forms of borrowing (Courchane and Zorn, 2008, Lusardi and Tufano, 2009), and are less likely to accumulate wealth (Stango and Zinman, 2008).

Recognizing these shortcomings among the population, federal agencies and creditor-sponsored coalitions promoting financial literacy have issued repeated calls for a greater role for personal financial education in public school curriculum (e.g., Federal Reserve Board of Governors 2001; U.S. Department of the Treasury 2005; Jump\$tart Coalition for Personal Financial Literacy 2008;). Many states have responded by adopting economics and financial education curriculum standards in the public schools. In its 2007 survey of K-12 curriculum in the United States, the Council on Economic Education (CEE) reported that 40 states have personal financial education standards, although only 28 states have required the standards be implemented. Twenty states require some form of personal finance instruction for secondary schools, either as a stand-alone course (7 states) or incorporated into other courses.

However, the goal of documenting the effectiveness of classroom-based financial education programs for youth has proven elusive. Evidence of links between high school or college-level courses in personal finance and either personal finance knowledge or behaviors is mixed. Bernheim, Garrett and Maki (2001) found that adults who had taken a personal finance course in high school saved more of their income as they grew older. Lyons (2008) and Shim et al (2009) found that taking personal finance courses reduced the incidence of risky credit behaviors. Tennyson and Nguyen (2001) found that state-level curriculum standards are not generally associated with higher student financial literacy test scores, but students in states that required specific financial education coursework scored significantly higher than those in states with either a general curriculum mandate or no mandate. In contrast, Mandell and Klein (2009) found no association between taking a high school personal finance course (of unspecified content) and the respondent's level of financial knowledge (as measured by the National Jump\$tart Coalition test). Peng, Bartholomae, Fox and Cravener (2007) found that taking a high

school personal finance course had no effect on financial behavior but taking a college personal finance course did.

Complicating all such empirical efforts is the fact that cognitive ability appears strongly correlated with observable personal finance benchmarks (e.g., savings and investment behavior; net worth), making it difficult to isolate the influence of the financial literacy education itself (Cole and Shastry, 2007). Even more problematic is that consumer time preferences have been shown to be empirically predictive of choices in a variety of inter-temporal settings (Chabris, et al 2008). Regarding borrowing behavior, Meier and Sprenger (2010) find that present-biased individuals are more likely to have credit card debt and have significantly higher amounts of card debt. But, risk and time preferences are difficult and expensive to measure, and such data have rarely been present in financial education evaluation studies.

How critical are data on individual risk and time preferences for models that attempt to explain a range of personal financial decisions? Do such measures have explanatory power beyond the credit card borrowing decision? That is the question we attempt to address in the following sections. If measures of risk and time preferences are predictive in the context of a wider range of financial decisions, it suggests a fruitful avenue for targeting interventions (e.g., educational messages; design of new product features) that could be effective in encouraging positive financial outcomes.

This paper utilizes a uniquely rich data set of college student financial attitudes and behaviors – including detailed measures of time preferences – to identify factors associated with risky borrowing and payment behaviors. The data were collected as part of a longitudinal survey of University of Arizona students (the Arizona Pathways to Life Success for University Students, APLUS project) that was launched in the spring of 2008 to examine the factors that contribute to

the formation of students' financial attitudes and behaviors (Shim, et al, 2009). In the initial APLUS survey (spring 2008), detailed data were collected for about one third of the 2007 University of Arizona freshmen class (2,000+ students). In addition to socio-demographic data, the APLUS sample provided information on a wide range of respondent characteristics that likely affect financial behaviors, as well as a set of variables on actual financial behaviors such as credit card ownership and balances. In addition, the authors conducted carefully controlled behavioral experiments on a subset of the APLUS sample in which participants were presented with a series of inter-temporal choices using techniques that have successfully measured such preferences in past studies. The subject's degree of impatience (as measured across choices between deferred rewards) and their level of risk tolerance turn out to have significant power to explain several types of borrowing and payment behaviors.

2. Model and Data Collection

Our approach closely follows the conceptual models developed by Shim et al (2009), who found that positive money management behaviors among young adults in their first year of university life depended strongly on skills and habits they developed through earlier family and high school socialization. Parents teach their children how to manage personal finances through direct conversations and instruction as well as by modeling appropriate behavior. Work experience and formal education through classes and seminars also can positively influence financial attitudes, confidence and behaviors. Such learning continues as students progress through college and into adult life. Finally, economic conditions and external economic shocks (e.g., parental unemployment or divorce; reduction in part-time job opportunities for students in school) can certainly influence observed financial decisions and behaviors. In the models

estimated below, we utilize survey data to construct measures of each of these explanatory factors, plus additional variables to the respondent’s risk and time preferences.

The original APLUS project invited the entire freshman class at the University of Arizona (approximately 6,000 students) to participate in a survey over an 8-week period in the spring semester of 2008. Modest incentives were provided to encourage participation. The survey questionnaire was posted online throughout the entire 8-week period of data collection. In addition, as a means of including students who had not responded to email recruiting efforts, a paper survey was administered in classrooms and freshman residential halls during the final weeks of the data collection. A total of 2,098 students (37% of the 2007 first-year cohort) completed the survey (86% online, 14% via paper). The survey produced a detailed inventory of money management attitudes, socialization experiences and behaviors.

Two years later (during February and March of 2010) 75% of the original APLUS sample were invited to participate in a new project that would augment the original APLUS data with new, experimentally derived information on risk and time preferences, plus updated survey information on financial behaviors and experiences from the intervening two years related to financial management and attitudes. A total of 231 subjects (15% of those invited) were recruited to participate from the original APlus Study. All were still students at the University of Arizona.

Table 2.1: Participants

Total Population = 231	
Male	97
Female	134
Hispanic	19
First Generation	23
Low Income	218

Protocols

Participants were recruited through email. Because all invitees had participated in a previous wave of the APlus Study, they were well aware of the purpose and nature of the project. To encourage participation in the experiment, the show-up fee and the range of payoffs were noted in the recruitment letter. In general, recruitment included a brief description of the time commitment involved, participation times available, the show-up fee, the potential to earn additional income and assurance of confidentiality and privacy. A set of student recruitment materials is available from the authors upon request.

For showing up on time, each participant received a \$10 show-up fee. This fee guaranteed that subjects would not leave the experiment empty-handed and allowed the experimenters to show the participants a good-faith gesture that would reinforce the experimenter's commitment to make promised payments. It was also intended to help each participant to feel committed to finishing the experiment.

Upon arrival, the experimenter greeted participants. The greeting reminded participants that all information collected would be kept confidential and used for research purposes only. All participants received an identification number to protect their confidentiality. Participants were also reminded that this was a volunteer study, one that required their consent. The receipt form at the conclusion of the session included a provision to authorize a confidential follow-up at a later, undetermined date. If they indicated that they would be available for follow-up research they were asked to include their name and address. Follow-up contacts could include surveys and verifications of subsequent actions by participants.

Instruction, experimental decisions, survey questions, literacy assessment and random draw were conducted on computers in the Economic Science Lab at the University of Arizona. To reinforce the electronic instructions (and instruction queries), printed summary instructions were at every workstation.

During the introduction to the experiment, participants were instructed that they could earn more than their show-up fee by completing *three* parts of the study: a set of real decisions about money over time and money over uncertain outcomes, a survey of current financial experiences and behaviours, and a life skills assessment (prose, document and numeracy).

The experiment instructions provided participants with appropriate details of the compensation available and quizzed them regarding their understanding of the payoffs for both the risk and inter-temporal type of decisions. Compensation included opportunities to receive cash rewards on the day of the experiment for the decisions under uncertainty and monetary rewards in the future in the form of money orders in response to questions that measured their preference for earlier vs. later receipts.

All inter-temporal decisions were paid in the future (more details below) with specific attention to keeping the transaction costs between options as close to equal as possible. All inter-temporal payoffs were paid via a money order mailed to participants. Participants were instructed to write their address on an envelope and indicate the date of payment and amount of payment on the interior flap in their own handwriting. This protocol is similar to that of Andreoni and Springer (2010).

Below, Figure 2.1 is a screen shot of how part of an array of intertemporal choices looks to participants. As participants wave the pointer over a choice it becomes highlighted yellow. If they select a choice, that choice is overlaid with a green check mark and the rejected choice is

overlaid with a red “X”. Participants can reverse this decision as many times as they wish until they click on the submit button at the bottom of each array.

Figure 2.1: Inter-temporal Decision Example



Figure 2.2 is a screen shot of how these decisions would look when the subject chose the “smaller sooner” (SS) option for the first choice and the “larger later” (LL) option for the second choice.

Figure 2.2: Completed Inter-temporal Decision Example

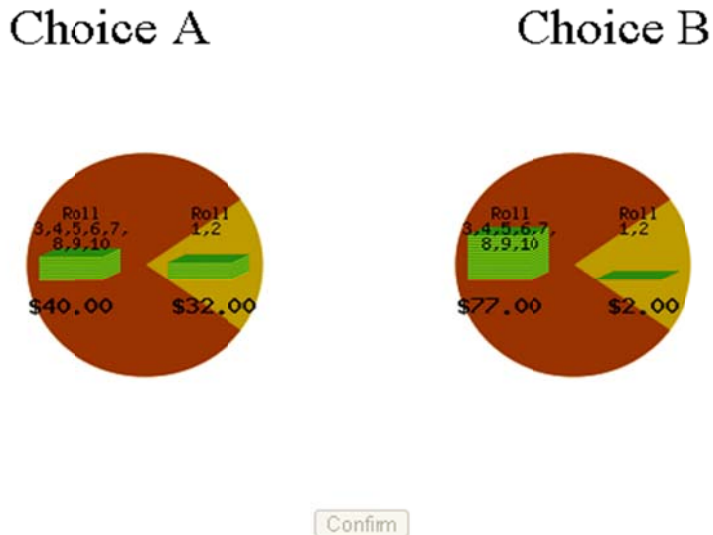


Decisions under uncertainty are presented as pairs of uncertain outcomes. Ten decisions included in the study are summarized in Table 2.2 below. For this study, all risky decisions were presented in the form of Figure 2.3 below.

Table 2.2: Summary of Decisions under Uncertainty

Probability of High Payoff	Probability of Low Payoff	Safe Choice	Risky Choice
.10	.90	\$24, \$30.00	\$1.5, \$57.75
.20	.80	\$24, \$30.00	\$1.5, \$57.75
.30	.70	\$24, \$30.00	\$1.5, \$57.75
.40	.60	\$24, \$30.00	\$1.5, \$57.75
.50	.50	\$24, \$30.00	\$1.5, \$57.75
.60	.40	\$24, \$30.00	\$1.5, \$57.75
.70	.30	\$24, \$30.00	\$1.5, \$57.75
.80	.20	\$24, \$30.00	\$1.5, \$57.75
.90	.10	\$24, \$30.00	\$1.5, \$57.75
1	0	\$24, \$30.00	\$1.5, \$57.75

Figure 2.3: Example of Decision Under Uncertainty



Choice would be indicated by an enlarged image and the non chosen lottery would appear as a smaller, greyscale version of itself. Subjects were able to freely switch between the two lotteries until they selected the confirm button at the bottom of the scrolling page. All ten lotteries were graphically presented on one page in the same order as in Table 2.2 above.

To familiarize participants with the experimental decisions, 6 practice examples were given to the participants before they began completing any of the real decisions. It was essential that they understood the nature of the decisions and how payment would be made. The experimental crew was composed of three to five people to ensure that all participants got the attention they needed to complete the practice decisions and the actual choices during the experiment. In practice, this level of manpower was not needed. The sessions were conducted with very little one-on-one help.

In completing the actual choices, participants made a decision for each choice and, after *all* decisions were made, the participant was prompted to answer a survey and then a literacy assessment. The literacy assessment was provided by Educational Testing Service (ETS).

To determine their actual compensation (payoff), participants used a random number generator where each decision number was matched with an electronic card. Participants watched the cards shuffle, and were prompted to select one of the shuffled cards to select the particular decision for which they'd be paid. Each decision had an equal probability of being selected, making decisions independent of each other.

The overall experience for each participant was scheduled to take two hours. Some participants finished in as little as one hour and ten minutes, others took up to two hours and thirty minutes to complete all three parts.

3. Measuring preferences

Risk Preferences

Several experimental procedures have been developed for measuring risk aversion.¹ Most experimental procedures for eliciting risk preferences fall into two broad categories: (1) A two-stage preference-revelation mechanism developed by Becker, Degroot and Marschak (BDM) (1964) which requires subjects to choose a selling price for a specified lottery, and (2) a choice between or among specified lotteries.² All mechanisms have come under scrutiny. Harbaugh, Krause and Vesterlund (2002) compare several different ways of eliciting risk, including valuation of lotteries and choices between lotteries, and find different patterns of errors

¹ Starmer (2000) surveys theoretical and empirical development in analyzing decision making under risk.

² With the BDM mechanism, if the randomly drawn price exceeds the participant's elicited price, the participant sells the lottery. If not, they play the lottery. Harrison (1986) Kachelmeier and Shehata (1992, Eisenberger and Weber (1995).

depending whether subjects are presented with valuation or choice tasks, suggesting that failing to account for such errors may significantly bias estimated risk preference parameters in ways that are task-dependent. Eckel, et al (2010) compare two elicitation techniques, both of which involve choices among lotteries. The simpler measure is a graphical modification of Eckel and Grossman (2002). The modification uses representations of probabilities as areas of a circle with the dollar outcomes within each area. The more complex measure (Holt and Laury (2002) uses a table and lists the probabilities and potential outcomes. They find that the simpler measure appears to be unambiguously superior for low math skill subjects as it generates smaller noise and equal predictive accuracy than the complex measure. For the experiment in this paper, we utilize a graphical adaptation of the risk elicitation method developed in Holt and Laury (2002). Example of these images were discussed in the previous section.

Table 3.1 provides the r ranges and the frequency of safe choices for the risk aversion measure developed by Holt and Laury (2002). Table 2.2 summarizes the exact choices used in this study. This widely-used experimental measure involves a set of ten binary choices between a high risk gamble and a low risk gamble. For each of the ten choices, the two gambles have the same probabilities but different low and high payoffs, making them relatively easy to compare. Most student subjects quickly see that they prefer Gamble A at the top of the decision sheet, and Gamble B at the bottom, implying some switch point in between. The switch point determines the number of safe choices and, in turn, the risk aversion parameter range. A risk neutral subject would switch between decisions 4 and 5, making 4 safe decisions. Subjects in this sample tend to be risk averse, making close to 6 safe decisions.

Using the number of safe choices as an aggregate measure is a fully accurate summary of the distribution of choices because all subjects made *consistent* decisions. Typically,

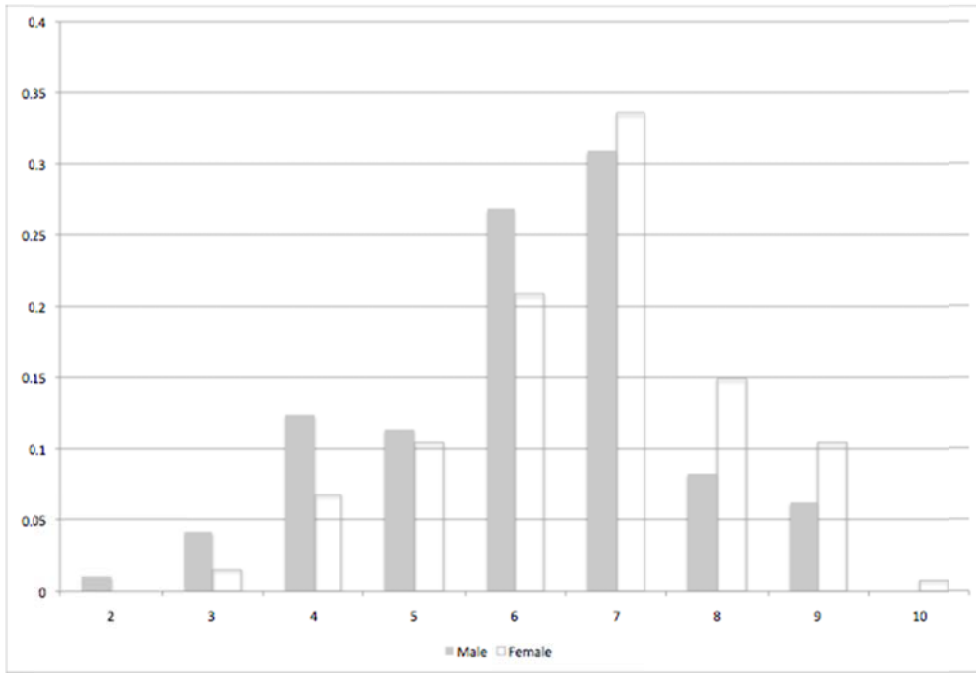
approximately 5 per cent of subjects make inconsistent choices either by switching more than once or by making “backwards” choices (switching in the other direction). This distribution of choices has smaller tails than those reported in Holt and Laury (2002) and Eckel et al (2010) for university students making decisions at this stakes level (equivalent to HL 15X Real treatment).

Table 3.1: Holt-Laury Gamble Choices

Number of Safe Choices	Implied CRRA Range	Safe Choices	
		Frequency	Percent
0	$r < -1.71$	0	0
1	$-1.71 < r < -0.95$	0	0
2	$-0.95 < r < -0.49$	1	0.43
3	$-0.49 < r < -0.14$	6	2.6
4	$-0.14 < r < 0.15$	21	9.09
5	$0.15 < r < 0.41$	25	10.82
6	$0.41 < r < 0.68$	54	23.38
7	$0.68 < r < 0.97$	75	32.47
8	$0.97 < r < 1.37$	28	12.12
9-10	$1.37 < r$	21	9.1

As in other studies (see Eckel 2007, Eckel and Grossman, 2007, and references therein), we find a higher degree of risk aversion for females. The distributions of safe choices for men and women are summarized in Figure 3.1 below.

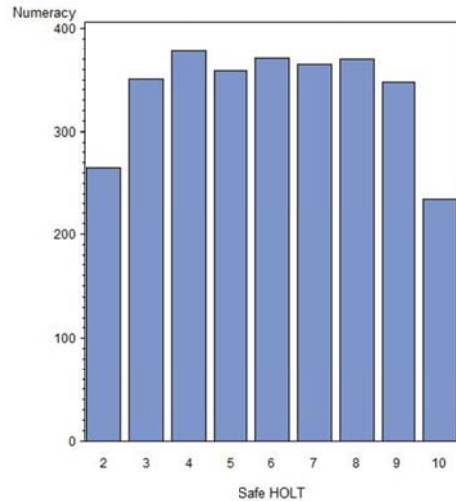
Figure 3.1: Proportion of Safe Choices for Men and Women



Low numerate ability is slightly associated with greater risk aversion.³ Figure 3.2 shows the relationship between Safe Choices and Numeracy. Please note that this figure merely shows the relationship between average Numeracy by safe choices, it is not weighted by the frequency of subjects at each choice. There is one subject choosing the most risk seeking position (2 safe choices) and only one subject choosing the all-safe position (10 safe choices).

³ Subjects completed a numeracy measure, consisting of 30 problems, involving the use of numbers in real-life situations. This test is a subcomponent of the Educational Testing Service’s Adult Literacy and Life skills Survey (ALLS), and was conducted online during the experimental session, after the survey but before payoff. This test has been used in over 33 countries to measure national literacy levels, and is known to correlate with labor market performance.

Figure 3.2: Safe choices by Numeracy



Measuring Inter-Temporal Preferences

A person's willingness to delay gratification often predicts financial behavior.

Experimentally measured patience has explained a fair proportion of the variation in such outcomes data as willingness to invest in own education, willingness to invest in a family member's education and willingness to invest in long term savings. (See Eckel, Johnson, and Montmarquette, 2002; and Johnson, Montmarquette, and Eckel, 2003.)

In principle, inter-temporal preferences can be elicited by offering a choice between two amounts with different dates of payment. The two amounts, smaller returns sooner (SS) and the larger returns later (LL) are designed to reward the subject for delaying gratification, i.e. rewarding saving. There are three design considerations: The timing of the SS, the investment time (wait time for LL), and the rate of return (which combined with the investment time and SS determines LL) (See Andreoni and Sprenger (2010), Eckel, Johnson, and Montmarquette, 2002 and 2005; Harrison et al., 2002). By carefully varying these parameters and offering each

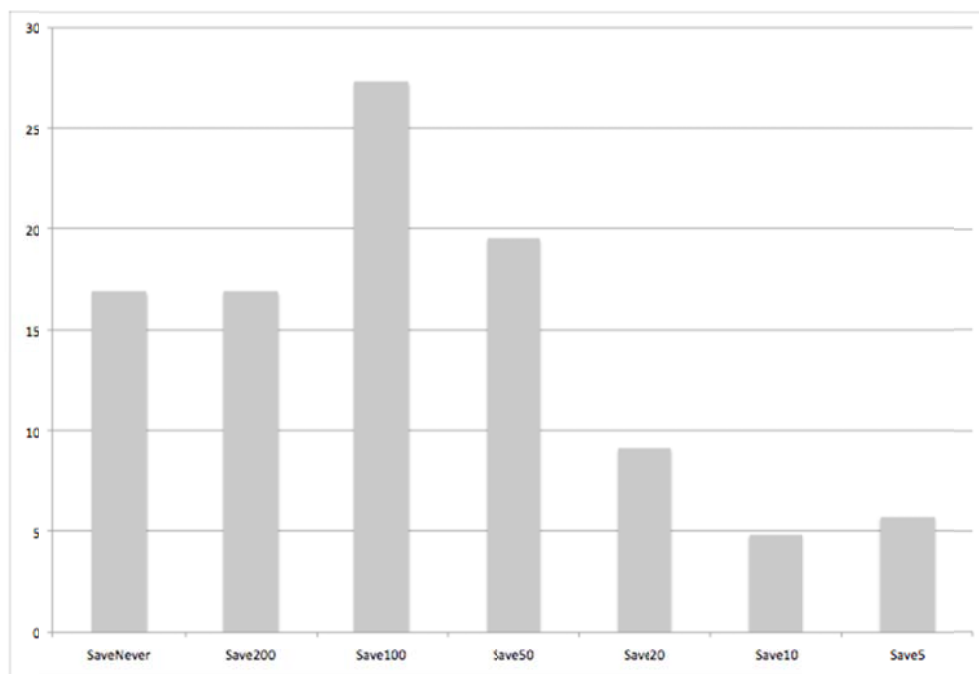
respondent a set of constructed binary choices, one can develop a comprehensive picture of each subject's willingness to forgo smaller returns sooner for larger returns later.

Table 3.2: Summary of Time Preference Choices

Two timings for \$50 Sooner Payment (SS)	Annualized Rates of Return %	Two wait periods for Larger Later Payment (LL)	
		THREE MONTH Investment	ONE YEAR Investment
ONE WEEK OR THREE MONTHS	5	50.63	52.50
	10	51.25	55.00
	20	52.50	60.00
	50	56.25	75.00
	100	62.50	100.00
	200	75.00	150.00

Table 3.2 summarizes the 4 arrays of time preference choices. These are presented to subjects in sets in which the time frame remains constant and only the rate of return varies. For instance, one set of choices indicates the sooner payment THREE MONTHS from the date of the experiment and the later payment 15 MONTHS from the date of the experiment. Comparing the choices for this array and another array that starts earlier (ONE WEEK) but with the same investment (ONE YEAR) period are used to test and control for possible present biased preferences (see the papers in Loewenstein et al., 2003). All four initial wait-time/investment period combinations are repeated using six annualized rates of return, as shown in the table. A broad range of rates of return is included because previous studies have suggested a great deal of variation in subject preferences (see Eckel et al., 2005). The range of responses for a THREE MONTH initial wait time and ONE YEAR investment period are illustrated in Figure 3.3. This array of choices will be used as the foundation of the time preference measure.

Figure 3.3: Proportion of participants induced to save \$50 for ONE YEAR (offered THREE MONTHS from the date of the experiment), annual simple interest rate noted “SaveR”.



4. Results

The variables used in the analysis are summarized in Appendix A. The data come from three sources: The original APLUS project (2008 Survey), an experimental session (2010 Experiment), and a second survey given at the time of the Experiment (2010 Survey). From the second survey we constructed 4 variables as proxies of behaviors we are most interested in explaining: Poor Money Management (POORMM), Risky Credit Card Behavior (RISKYCC), Risky Financial Financial Behavior (RISKYBEH) and REVOLVE. Each measures different dimensions of money management behavior.

POORMM is a scale composed of responses to five questions about general money

management behaviors without any specific inclusion of credit card behavior: Paying bills on time, saving money each month, saving for emergencies, tracking monthly expenses, and spending within budget. Response options were “never”, “rarely”, “sometimes”, “often”, and “very often” (reverse coded). A higher value of POORMM indicates poorer management.

RISKYCC is also a scale created from responses to three questions about credit card behavior. A higher value of RISKYCC indicates a subject admitting to risky credit card tendencies in the areas of leaving unpaid balances from month to month, borrowing cash from a credit card and spending up to their maximum credit limit. Response options ranged from “never” to “very often”.

RISKYBEH combines the two subscales of PoorMM and RiskyCC, allowing us to assess if and how these two types of financial behaviors enhance one another.

REVOLVE is a simple dummy variable that takes on a value of one if the subject volunteered in the survey a positive amount that will not be paid in full “this month” on all their credit cards. REVOLVE takes on a value of 0 if the respondent indicates that credit card balances will be paid in full or if they have no credit card. 27% of the sample indicated that they revolve.

Factors that could help explain the behaviors of interest are grouped into 5 broad categories: Control Variables, Parent Socialization, Financial Attitudes, Efficacy and Education, Current Financial Status and Underlying Preferences. The control variables included are Male, Hispanic and First in family to go to College (FIRSTGEN). All participants in the study were in their third year of study of the University of Arizona.

Parent Socialization is accounted for through four variables. The first two are father’s education level and PARENTAL INCOME (higher value means more education and more income).

Two additional variables capture whether parents talked to the participant before they came to college about family financial matters (Parent Finance Talk) and how to establish a good credit (PARENT CREDIT RATING).

Several variables account for financial attitudes and education. Subjects were asked to rate their overall understanding of personal finance and money management concepts and practice (SUBJECTIVE MM). They were asked how confident they felt about their ability to manage their own finances (FINANCIAL EFF). They indicated whether they took a university course designed to provide students with a better of understanding of personal finance (UNIVERSITY COURSE). 27% of subjects indicated they had such a course. In the 2008 survey, they indicated whether they had a personal finance course in high school (HS COURSE). They were queried in the 2010 survey as to how effective they thought the college courses were in helping them with the way they managed money (COURSES HELP MM). They also indicated their overall level of satisfaction with their current financial status (SATISFIED FIN STATUS). Student financial independence from parents and three questions about the impact of recent recession round out the set of variables intent on capturing subjects' current financial status.

The last set of factors used to explain POORMM, RISKYCC, RISKYBEH and REVOLVE are derived from two sets of experimental decisions: decisions over cash payoffs with uncertain outcomes (SAFE CHOICES) and decisions over monetary payoffs with different payout dates (PRESENT BIAS, SAVE50, SAVE 100, SAVE 200, SAVENEVER).

To briefly review, subjects were asked to make ten choices under uncertainty summarized in Table 2.3 and depicted in Figure 2.3. For each of the ten choices between two lotteries, the probability on the high outcome is always the same. For the subjects, the pie-shading in the graphical depiction is the same between the two lotteries. The cash amount associated with each

probability wheel is what is different between the two lotteries. These are illustrated by proportional stacks of green bills. These stacks are constant between choices. Only probability on the high payoff changes from choice to choice, increasing by 10 percentage points with each choice. This makes the choices relatively easy to compare. Most student subjects quickly see that they prefer Gamble A at the top of the scrolling decision sheet, and Gamble B at the bottom, implying some switch point in between. If there are not inconsistent decisions, the switch point determines the number of safe choices and, in turn, the risk aversion parameter range. Using the number of safe choices as an aggregate measure is a fully accurate summary of the distribution of choices because all subjects made *consistent* decisions. Subjects in this sample tend to be risk averse, making between 6 and 7 safe decisions. The higher value SAFE CHOICES takes on, the more risk averse the subject.

Two measures of preference for savings are constructed from the intertemporal choice decisions. First, let's focus on one array of intertemporal decisions. Participants were asked whether they would like \$50 three months from the day of the experiment or the \$50 saved for 15 months from the day of the experiment. They were asked to make this same decision 6 times with six different rates of return: 5, 10, 20, 50, 100, and 200 percent. If the subject always took the \$50 SS payment, the SAVENEVER variable takes on a value of one (and zero otherwise). If they saved \$50 only when the rate of return reached 200%, SAVE200 takes on a value of one. SAVE100 and SAVE50 are similarly defined. The partition of the sample that takes on a value of zero for all these variables is the group that saved when the interest rate was 20, 10 or 5%. These subjects who are more easily induced to save represent 20% of the sample, and are used as the reference group for the above defined set of dummy variables.

PRESENT BIASED takes on a value of one if a participant is more likely to save for one year if

the choice to save is poised three months in the future rather than one week in the future. Only 17 subjects exhibited such a behavior. This is a relatively low proportion of subjects in studies designed to capture this behavior. We attribute it to carefully constructing the transaction costs to be as equal as possible per intertemporal outcome. Finding low incidence of present biased behavior is consistent with Andreoni and Sprenger's (2010) work on intertemporal preferences.

Investigating POORMM

Recall that PoorMM is the sum of five separate budgeting, tracking, bill payment and saving behaviors. Given the composition of the sets of variables created to explain PoorMM, it is natural to run a set of sequential regressions, with an eye to observing the explanatory power of successive sets of variables. Table 4.1 summarizes the parameter estimates of such a set of regressions. The regression analysis offers little insight into the determinants of this aggregate measure of poor money management behavior. Besides being male, the only characteristics that correlate with the PoorMM are FINANCIAL EFF and SATISFIED FIN STATUS. These correlate in the expected direction: more confidence and satisfaction is associated with better money management. Neither coursework in personal finance nor the subjective value of coursework correlates to PoorMM. Similarly, the measures of risk attitudes and intertemporal preferences play no role in predicting poor money management behavior.

Investigating RISKYCC

Table 4.2 summarizes the parameter estimates of the set of regressions designed to investigate risky credit card behavior. Recall that RiskyCC takes on higher values the more often that subjects respond that they revolve credit card balances, max out their card limits, and borrow

money from their cards. The regression estimates for models 3 and 4 reveal that the parent socialization works in two directions. The more education the father has, the less risky the credit card behavior, but having more frequent dialogue with parents about family finances correlates to riskier credit card use (perhaps because of overconfidence or poor parental role modeling in their own actions). Personal attitudes also work in two different ways. The better the student thinks he/she handles money (SUBJECTIVE MM) the riskier their credit card use (overconfidence?) . But the more satisfied they are with their financial status the less risky their credit card use. The relationship with financial satisfaction is a strongly significant result. Again, none of the financial education variables indicate there is a relationship between risky credit card use and courses taken or impressions of usefulness of such courses. Adding the experimental measures of preferences (Model 5) almost doubles the adjusted R^2 of the specification. All variables that were significant remain significant with roughly the same magnitude on the coefficients, but FINANCIAL EFFICACY enters, indicating that self-confidence in handling money reduces risky credit card behavior. Four of the six experimental measures are statistically significant, all at the 2% confidence level or better and with the expected signs. Being PRESENT BIASED and relatively impatient (SAVE200, SAVENEVER) positively correlates with risky credit card behavior. Risk aversion (SAFE CHOICES) is negatively correlated with risky credit card behavior.

Investigating RISKYBEH

We define overall risky financial behavior (*RISKYBEH*) as the sum of POORMM and RISKYCC. Consequently, RiskyBeh is an amalgam of budgeting, saving, bill-paying and credit card borrowing behaviors, all of which are relevant for college students. Both POORMM and RISKYCC can be seen as indicative of risky financial behaviors, being that individuals who

practice poor money management and risky credit card usage put themselves at financial risk. The results summarized in Table 4.3 are quite similar to the results of the previous two regressions with some dampening and some amplification. PARENT FINANCE TALK doubles in impact (but still curiously associated with riskier behavior) and FINANCIAL EFFICACY intensifies in duration, magnitude and significance. Satisfied Fin Status remains negatively and significantly related to risk behaviors. Father's education level is no longer significant. Only two of the experimental measures have an impact, PRESENT BIASED and SAVENEVER, both with the expected signs. So again, those who are more likely to save if the decision is delayed months in the future and those that are the least patient are more likely to exhibit risky behavior.

Investigating REVOLVE

We use a binary logit to investigate the behavior to revolve on credit card debt. Table 4.4 summarizes the parameter estimates using the same set of independent variables discussed above. No control variables correlate with the self reported behavior to revolve. Among the parent financial socialization variables, Parental Income is negatively correlated with revolving: the higher the student's parents' income, the less likely they will revolve. Parent Finance Talk is positively correlated with revolving behavior, consistent with the findings of the previous models. Financial Independence from parents is also positively correlated with revolving behavior. Being satisfied with financial status is highly negatively correlated with revolving. Those students are present biased are more likely to revolve, as are the least patient 34% of the sample (SAVENEVER + SAVE 200), consistent with expectations. Those are more risk averse in the experimental decisions under uncertainty (SAFE CHOICES) are less likely to revolve.

Just to reiterate, none of the financial education variables indicate there is a relationship

between any of the dependent variables we constructed on risky financial behaviors and courses taken or impressions of usefulness of such courses.

5. Discussion

These findings are at once interesting and disappointing. On the “disappointing” side of the ledger, as the title of the paper suggests, we set out expecting to find some positive relationships between less risky money management behaviors and both parental financial socialization and financial education. Admittedly, prior studies linking formal financial education and work experience to positive financial behaviors showed mixed results. So, our failure to find any significant relationship in our sample is not startling. However, the results on financial socialization are curious. Students from families with higher incomes revolve less, but that could be because they have less need to borrow on campus (or because their parents cover some or all of their credit card payments). Student financial confidence is negatively related to poor money management and risky behaviors, as is satisfaction with their financial situation. Both of these variables behave as expected. But, controlling for parental income, students who report a greater dialogue with their parents on money management issues generally engage in riskier money management and borrowing behaviors. This result was unexpected, especially when student financial confidence (efficacy) is negatively related to risk behaviors. Of course, the estimates do not capture the financial behaviors of the parents, which could serve as role models to the students, either positive or negative.

More encouraging are the results associated with the experimental measures of risk and time preferences. These clearly have predictive power on this varied set of financial behaviors, and in the expected direction. Students who are less patient and less risk averse tend to exhibit riskier money management and borrowing behaviors, similar to the findings in Meier and

Sprenger (2010). This suggests to us that most prior studies of the effectiveness of financial education interventions (classroom, workplace, parental socialization, etc) suffer from omitted variable bias. To be sure, our current study does include such financial education variables, along with data on risk and time preferences, and finds no impact of the interventions. But, this should not be taken as very powerful evidence one way or the other on the effectiveness of education as there is little information in our survey about the nature of those educational interventions, length of exposure, or respondent performance in the case of a formal course. Rather, our interpretation of these results is that future efforts to measure the effectiveness of educational interventions should be sure to include measures of respondent inter-temporal preferences, along with carefully constructed variables capturing the educational intervention itself.

If preferences (especially time preferences) are an important driver of personal financial decisions, what does this suggest for financial education going forward? Certainly, one possible contribution would be to develop parsimonious measures of time preferences that could help to sort students into groups for more tailored financial education treatments or experiences. Another possibility that we find particularly intriguing – and the topic for the next phase of research on this project – is the prospect that simple interventions might be able to change preferences. Here we have in mind a variety of interventions that amount to assisted self-discovery: if subjects are told something about their own tendencies toward patience or impatience, they might have a “light bulb” moment and change their behavior. This is all speculative, but an indication of how information on preferences can be used to improve education interventions and subsequent behavior.

Table 4.1: Determinants of POORMM, n=231, Standard Errors (--)

	Model		Model		Model		Model		Model	
	1	Pr > t	2	Pr > t	3	Pr > t	4	Pr > t	5	Pr > t
Intercept	12.712 (.907)	<0.0001	13.334 (1.719)	<0.0001	19.284 (2.266)	<0.0001	19.327 (2.504)	<0.0001	19.033 (2.831)	<0.0001
Male	-0.705 (.540)		-0.802 (.547)		-1.248 (.546)	0.023	-1.172 (.554)	0.036	-1.121 (.570)	0.051
Hispanic	0.214 (.978)		-0.183 (1.021)		-0.174 (.985)		-0.089 (1.00)		-0.050 (1.013)	
FirstGen	0.507 (.904)		0.193 (.977)		0.423 (.941)		0.516 (.951)		0.580 (.967)	
FatherEdu			-0.174 (.275)		-0.015 (.270)		-0.005 (.272)		0.014 (.281)	
Parental Income			-0.108 (.170)		-0.056 (.167)		-0.042 (.175)		-0.037 (.182)	
Parent Finance Talk			0.390 (.265)		0.283 (.258)		0.274 (.261)		0.295 (.266)	
Parent Credit Rating Talk			-0.213 (.216)		-0.162 (.209)		-0.155 (.212)		-0.133 (.216)	
Subjective MM					-0.149 (.371)		-0.094 (.376)		-0.086 (.384)	
Financial Efficacy					-1.026 (.327)	0.002	-1.057 (.331)	0.002	-1.061 (.338)	0.002
Courses help MM					-0.381 (.602)		-0.308 (.608)		-0.386 (.623)	
Satisfied Fin Status					-0.520 (.238)	0.029	-0.516 (.247)	0.038	-0.534 (.254)	0.037
University Course					0.207 (.682)		0.198 (.687)		0.180 (.709)	
HS Course					0.123 (.641)		0.199 (.647)		0.147 (.665)	
Fin Independent							-0.377 (.909)		-0.303 (.937)	
Recession Family							0.171 (.298)		0.168 (.304)	
Recession Own							0.074 (.337)		0.051 (.341)	
Recession MM							-0.368 (.302)		-0.373 (.306)	
Present Biased									0.464 (1.053)	
Safe Choices									-0.007 (.183)	
Save50									0.520 (.868)	
Save100									-0.142 (.797)	
Save 200									-0.133 (.886)	
SaveNever									0.852 (.900)	

Adjusted R ²	-0.003	-0.006	0.083	0.074	0.058
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Table 4.2: Determinants of RISKYCC, n=231, Standard Errors (--)

	Model 1		Model 2		Model 3		Model 4		Model 5	
		Pr > t		Pr > t		Pr > t		Pr > t		Pr > t
Intercept	4.756 (.472)	<0.0001	5.824 (.872)	<0.0001	6.375 (1.162)	<0.0001	6.222 (1.283)	<0.0001	6.917 (1.373)	<0.0001
Male	-0.017 (.281)		-0.080 (.277)		-0.018 (.280)		-0.048 (.284)		0.071 (.277)	
Hispanic	0.103 (.509)		-0.198 (.518)		0.068 (.505)		0.136 (.512)		0.062 (.491)	
FirstGen	0.025 (.470)		-0.511 (.495)		-0.313 (.482)		-0.254 (.488)		-0.033 (.469)	
FatherEdu			-0.467 (.139)	0.0009	-0.340 (.139)	0.015	-0.331 (.139)	0.018	-0.347 (.136)	0.012
Parental Income			0.033 (.086)		0.060 (.085)		0.073 (.090)		0.062 (.088)	
Parent Finance Talk			0.291 (.134)	0.031	0.266 (.132)	0.046	0.255 (.134)	0.058	0.306 (.129)	0.019
Parent Credit Rating Talk			-0.079 (.110)		-0.071 (.107)		-0.069 (.109)		-0.035 (.105)	
Subjective MM					0.321 (.190)	0.092	0.334 (.193)	0.084	0.323 (.186)	0.084
Financial Efficacy					-0.249 (.168)		-0.263 (.169)		-0.332 (.164)	0.044
Courses help MM					-0.097 (.309)		-0.099 (.312)		-0.247 (.302)	
Satisfied Fin Status					-0.477 (.122)	0.0001	-0.437 (.126)	0.0007	-0.383 (.123)	0.002
University Course					0.276 (.350)		0.265 (.352)		0.362 (.344)	
HS Course					0.195 (.329)		0.198 (.332)		-0.032 (.323)	
Fin Independent							-0.001 (.466)		0.183 (.455)	
Recession Family							-0.099 (.153)		-0.058 (.148)	
Recession Own							0.262 (.172)		0.226 (.165)	
Recession MM							-0.126 (.155)		-0.180 (.149)	
Present Biased									1.971 (.511)	0.0002
Safe Choices									-0.214 (.089)	0.017
Save50									0.520 (.421)	
Save100									0.570 (.387)	
Save 200									1.018 (.430)	0.019
SaveNever									1.062 (.436)	0.016
Adjusted R ²	-0.013		0.035		0.100		0.093		0.173	

Table 4.3: Determinants of RISKYBEH, n=231, Standard Errors (--)

	Model 1		Model 2		Model 3		Model 4		Model 5	
		Pr > t		Pr > t		Pr > t		Pr > t		Pr > t
Intercept	17.468 (1.129)	<0.0001	19.157 (2.117)	<0.0001	25.660 (2.759)	<0.0001	25.549 (3.048)	<0.0001	25.949 (3.399)	<0.0001
Male	-0.722 (.672)		-0.882 (.674)		-1.265 (.664)	0.058	-1.220 (.675)	0.072	-1.050 (.685)	
Hispanic	0.318 (1.217)		-0.381 (1.258)		-0.107 (1.199)		0.046 (1.217)		0.012 (1.216)	
FirstGen	0.532 (1.125)		-0.317 (1.203)		0.110 (1.145)		0.262 (1.158)		0.547 (1.161)	
FatherEdu			-0.641 (.338)	0.059	-0.355 (.329)		-0.335 (.331)		-0.333 (.338)	
Parental Income			-0.075 (.210)		0.005 (.203)		0.031 (.213)		0.025 (.218)	
Parent Finance Talk			0.682 (.326)	0.038	0.549 (.314)	0.082	0.529 (.318)	0.097	0.601 (.320)	0.062
Parent Credit Rating Talk			-0.292 (.267)		-0.233 (.254)		-0.225 (.258)		-0.167 (.259)	
Subjective MM					0.172 (.451)		0.240 (.457)		0.238 (.461)	
Financial Efficacy					-1.275 (.398)	0.001	-1.321 (.402)	0.001	-1.393 (.405)	0.001
Courses help MM					-0.479 (.733)		-0.407 (.740)		-0.633 (.748)	
Satisfied Fin Status					-0.997 (.290)	0.001	-0.953 (.300)	0.002	-0.916 (.305)	0.003
University Course					0.483 (.831)		0.463 (.836)		0.542 (.852)	
HS Course					0.318 (.780)		0.397 (.787)		0.115 (.799)	
Fin Independent							-0.378 (1.106)		-0.121 (1.126)	
Recession Family							0.071 (.363)		0.109 (.365)	
Recession Own							0.336 (.410)		0.277 (.409)	
Recession MM							-0.494 (.367)		-0.553 (.368)	
Present Biased									2.435 (1.265)	0.056
Safe Choices									-0.222 (.220)	
Save50									1.040 (1.043)	
Save100									0.428 (.957)	
Save 200									0.885 (1.064)	
SaveNever									1.914 (1.081)	0.078
Adjusted R ²	-0.006		0.013		0.122		0.113		0.121	

Table 4.4: Determinants of REVOLVE, Binary Logit, n=231, Standard Errors (--)

	Model 1		Model 2		Model 3		Model 4		Model 5	
		Pr > t		Pr > t		Pr > t		Pr > t		Pr > t
Intercept	-0.959	0.060	-1.300		-1.394		-1.265		-0.586	
	(.510)		(.978)		(1.411)		(1.541)		(1.806)	
Male	-0.041		-0.105		-0.016		-0.067		-0.001	
	(.304)		(.313)		(.342)		(.348)		(.369)	
Hispanic	0.240		-0.098		0.176		0.113		0.029	
	(.529)		(.566)		(.607)		(.624)		(.65)	
FirstGen	-0.002		-0.069		0.133		0.161		0.410	
	(.508)		(.552)		(.576)		(.583)		(.601)	
FatherEdu			-0.015		0.121		0.118		0.165	
			(.153)		(.165)		(.167)		(.183)	
Parental Income			-0.205	0.037	-0.182	0.081	-0.166		-0.211	0.082
			(.098)		(.105)		(.111)		(.121)	
Parent Finance Talk			0.260		0.248		0.266		0.328	0.069
			(.159)		(.165)		(.169)		(.180)	
Parent Credit Rating Talk			0.096		0.099		0.127		0.154	
			(.125)		(.135)		(.139)		(.145)	
Subjective MM					0.231		0.195		0.216	
					(.235)		(.239)		(.25)	
Financial Efficacy					-0.125		-0.141		-0.240	
					(.201)		(.204)		(.216)	
Courses help MM					0.233		0.187		0.056	
					(.372)		(.377)		(.395)	
Satisfied Fin Status					-0.516	0.001	-0.538	0.001	-0.538	0.002
					(.154)		(.162)		(.17)	
University Course					0.292		0.319		0.393	
					(.404)		(.409)		(.442)	
HS Course					0.522		0.525		0.309	
					(.424)		(.43)		(.444)	
Fin Independent							0.912	0.089	1.079	0.064
							(.536)		(.583)	
Recession Family							-0.124		-0.068	
							(.193)		(.209)	
Recession Own							0.027		-0.020	
							(.203)		(.211)	
Recession MM							0.071		0.019	
							(.189)		(.200)	
Present Biased									1.395	0.026
									(.627)	
Safe Choices									-0.210	0.071
									(.117)	
Save50									0.763	
									(.614)	
Save100									0.414	
									(.567)	
Save 200									1.115	0.062
									(.598)	
SaveNever									1.261	0.037
									(.604)	

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Appendix A: Variable Definition Table

Variable Name	Source	Source Detail	Min	Max	Mean
Dependent					
PoorMM (Poor Money Management Skills)	2010 Survey	Indicate how often you have engaged in the following activities <u>within the past six months</u> ... Paid bills on time each month (Reversed) ... Saved money each month for the future (Rev) ... Saved for emergencies (Rev) ... Tracked monthly expenses (Rev) ... Spent within the budget (Rev)	5	22	11.67
RiskyCC (Risky Credit Card Behavior)	2010 Survey	Indicate how often you have engaged in the following activities <u>within the past six months</u> ... Paid off my credit card balance in full every month (Rev) ... Borrowed money from credit cards ... Maxed out credit card limit	3	12	4.74
RiskyBeh	2010 Survey	PoorMM + Risky CC	8	30	16.41
Revolve	2010 Survey	Approximately what is the total amount owed on all credit cards (including store specific credit cards) that will <u>not be paid in full</u> this month (i.e., credit card balance forward rounded up to nearest 100's)? \$____ (1 = Revolve	0	1	0.27
Independent					
Male	2008 Survey	I am a male = 1, I am a female = 2	1	2	1.58
Hispanic	2010 Survey	My primary ethnic background is...Hispanic/Latino	0	1	0.08
FirstGen	2008 Survey	I am the first person in my immediate family to go to college.	0	1	0.10
FatherEdu	2008 Survey	What is your father's level of education? (Value increases with education level)	1	5	3.75
Parental Income	2010 Survey	What is YOUR PARENT(S) combined annual income? (<25K, 25K increments, >150K)	0	6	3.59
Parent finance talk	2008 Survey	<u>Before coming to college while growing up at home,</u> indicate to what extent you think <u>your parent(s)</u> engaged in the following behaviors ... Discussed family financial matters with me. (1 = Never, 5 = Always)	1	5	3.47
Parent credit rating talk	2008 Survey	<u>Before coming to college while growing up at home,</u> indicate to what extent you think <u>your parent(s)</u> engaged in the following behaviors ... Discussed how to establish a good credit rating. (1 = Never, 5 = Always)	1	5	3.39

Variable Name	Source	Source Detail	Min	Max	Mean
Subjective MM	2010 Survey	How would you rate your overall understanding of personal-finance and money-management concepts and practice? (1=Very Low, 5 = Very high)	1	5	3.07
Financial Eff	2010 Survey	How confident do you feel about your ability to manage your own finances? (1 = Not very sure at all, 5 = Very sure)	1	5	3.70
Courses help MM	2010 Survey	To what extent do you think college courses and/or financial workshops have helped you with the way you manage your money? (Moderate, More than adequate, Quite a lot = 1, 0 Otherwise)	0	1	0.43
Satisfied Fin Status	2010 Survey	I am satisfied with my current financial status. (1 = Strongly disagree, 5 = Strongly Agree)	1	5	3.05
University Course	2010 Survey	Took university classes deigned to provide students a better understanding of personal finance, for example, INDV 102 (Money, Consumers, and Society).	0	1	0.27
HS Course	2008 Survey	While in high school, how many courses did you take related to personal financial management, consumer education, economics or business courses? (Any course in high school = 1)	0	1	0.78
Fin Independent	2010 Survey	I am financially independent from my parents (i.e., parents do not clam you on their tax return)	0	1	0.10
Recession family	2010 Survey	To what extent do you think that the recent economic decline has affected...your family and/or parents' financial situation? (1=Not at all, 5 = A great deal)	1	5	3.29
Recession Own	2010 Survey	To what extent do you think that the recent economic decline has affected...your own financial situation? (1=Not at all, 5 = A great deal)	1	5	2.88
Recession MM	2010 Survey	To what extent do you think that the recent economic decline has affected... the way you manage your money now? (1=Not at all, 5 = A great deal)	1	5	3.12
Present Biased	2010 Experiment	Participant more willing to save \$50 when the option with earlier availability is posed further in the future (three months from the day of the experiment rather than one week from the day of the experiment)	0	1	0.07
Safe Choices	2010 Experiment	Number of times the participant chose the less risky pair of outcomes (\$24 and \$30 vs. \$1.50 and \$57.75)	2	10	6.46
Save50	2010 Experiment	Participant saved \$50 for one year at 50% annual interest (but not less)	0	1	0.19
Save100	2010 Experiment	Participant saved \$50 for one year at 100% annual interest (but not less)	0	1	0.27
Save200	2010 Experiment	Participant saved \$50 for one year at 200% annual interest (but not less)	0	1	0.17
SaveNever	2010 Experiment	Participant never saved \$50 for one year, even at 200% interest	0	1	0.17