Discounting Financial Literacy

Time Preferences and Participation in Financial Education Programs*

Stephan Meier† Charles Sprenger‡

August 6, 2009

Abstract

Many policymakers and economists argue that financial literacy is key to financial well-being. But why do many individuals remain financially illiterate despite the benefits of being financially informed?

This paper presents results from a field study linking individual decisions to acquire financial information to a normally unobservable characteristic: time preferences. We elicited time preferences using incentivized choice experiments for all individuals to whom a financial education program was offered. Our results show that individuals who choose to acquire personal financial information have substantially higher discount factors than individuals who don't, i.e. they discount the benefits of being financially literate less.

JEL classification: D03, D14, D91, C93

Keywords: financial literacy, time preferences, selection, experiments

*We are grateful to James Andreoni, Daniel Benjamin, Chris Foote, Andreas Fuster, Lorenz Goette, Glenn Harrison, Simon Luechinger, Joanna Stavins, Alois Stutzer and the Federal Reserve Bank of Boston. This research project was started while both authors were working at the Federal Reserve Bank of Boston. The views expressed in this paper are, however, those of the authors and not necessarily those of the Federal Reserve System or the Federal Reserve Bank of Boston. This paper was previously entitled "Selection into Financial Literacy Programs: Evidence from a Field Study".

†Columbia University, Graduate School of Business, 710 Uris Hall, 3022 Broadway, New York, NY 10027; sm3087@columbia.edu.

‡University of California at San Diego, Department of Economics, 9500 Gilman Drive, La Jolla, CA 92093; csprenge@ucsd.edu.

1 Introduction

In personal finance, as in other areas of decision-making, information is thought to be a good thing. Financially literate individuals make fewer mistakes and are in better financial condition than financial illiterates (for surveys, see Lusardi and Mitchell, 2007; Bernanke, 2006). Based on the positive association between financial knowledge and financial outcomes, policymakers promote informational programs, such as credit counseling, homeownership classes, and retirement seminars. Recent changes to U.S. bankruptcy law, requiring individuals to undergo credit counseling, illustrates the importance that policymakers place on providing financial information.[1]

Despite the apparent importance of financial literacy, many individuals remain financially illiterate. Evidence shows that a large number of individuals lack even basic financial understanding. People generally score poorly on financial literacy exams (see, for example, National Council on Economic Education, 2005; Mandell, 2004) and fail to understand financial instruments (see, John Hancock Financial Services, 2002).[2] Furthermore, Lusardi and Mitchell (2007) show that only around half of individuals in the Health and Retirement Survey are able to answer two simple questions on inflation and compound interest. It remains an open question why, if acquiring financial information is so critical to financial well-being, many do not choose to become more financially informed.

Very little evidence exists exploring the decision processes underlying the acquisition of financial information. One view is that the acquisition of financial information is a form of investment. Presumably, individuals acquire financial information, incurring costs in the present, with an expectation of positive financial returns on this investment in future periods. As in other cases where returns are delayed, time preferences should play a role in determining whether or not an individual chooses to acquire

[1] A debtor may be eligible for bankruptcy under Chapter 7 only if he or she has participated in an approved credit counseling session in the previous 180 days. See 11 U.S.C. §§ 109, 111 for details.

[2] For a survey on the state of financial literacy, see Lusardi (2006) and papers cited therein.

personal financial information. All else equal, less patient individuals should be less likely to invest in gaining financial information. We test this hypothesis by combining objective data on financial information acquisition with directly measured differences in individual time preferences.

Evidence in this paper comes from a field study implemented in cooperation with the City of Boston and a large credit counseling firm. Between January and April of 2007 the credit counseling firm offered a short credit counseling session to around 870 individuals waiting for tax filing assistance in a city-coordinated Volunteer Income Tax Assistance (VITA) site. The counseling session included an overview of the individual's credit report, with their credit score, along with useful, generally unknown credit information (see below). About 55 percent of individuals chose to take up the counseling program. Independently, we elicited the time preferences of *all* individuals to whom the program was offered using standard incentivized experimental methods. Study participants' time preferences were elicited using price lists asking individuals to choose between sooner and later monetary payments (see, for example, Harrison et al., 2002; Reuben et al., 2008). Resulting time preference measures are correlated with individual decisions on take-up of the offered credit counseling program.

Analyzing the acquisition of financial information in the above framework has several advantages. First, the outcome (take-up of the counseling session) is objectively observable and does not depend on cognitive abilities (as some financial literacy tests do). Second, the credit counseling session should have been of value to most study participants. Knowledge about credit scoring and one's credit score is very important in the United States for financial decisions, since credit scores are used to determine the issuance of credit and credit interest rates. Credit reports may also be legally used by employers, landlords, and insurance companies in their decision-making (see 15 U.S.C. §1681b). The counseling program was designed to provide critical financial information that would be of value to individuals with credit histories, individuals without credit

histories and individuals who already knew their credit score. Third, the opportunity cost of participating is low, as participants are waiting to get their taxes prepared.

Our results show that time preferences are highly correlated with financial information acquisition. More patient individuals are more likely to take up the offered credit counseling program. The results are maintained when controlling for socio-demographic characteristics including gender, race, age and, critically, income and education. We additionally show that more patient individuals have greater financial knowledge prior to the field study, providing support for our initial finding. Controlling for this prior financial knowledge and proxies for financial experience and credit constraints, more patient individuals remain more likely to take up the counseling program. This suggests that prior financial experience and financial acumen cannot explain the correlation between measured time preference parameters and the decision to participate in the field study's short credit counseling program.

The finding that financial information acquisition is positively correlated with time preferences helps to explain why some individuals remain financially illiterate despite the apparent benefits of financial knowledge. Acquiring financial information may not be an attractive investment for some groups of individuals; very impatient individuals being one critical subgroup. For policy makers this gives critical insights as to what type of consumers can be reached by voluntary education programs and how to increase attractiveness of such programs.

Previous research has found that more patient individuals have better financial outcomes, as they search longer for a good job (DellaVigna and Paserman, 2005), experience steeper wage growth (Munasinghe and Sicherman, 2006), take up welfare programs earlier (Fang and Silverman, 2008), have higher credit scores, and are less likely to default on their loans (Meier and Sprenger, 2008). This indicates that more patient individuals, who we find to be more willing to acquire financial information, may already be on the path to better outcomes. Our results indicate that if financial

information interventions do not rely on randomization, then their measured educational effects are most likely *overestimated*. Relatively few studies actually solve this selection problem. Notable exceptions include Bernheim et al. (2001) and Cole and Shastry (2007) who use changes in state level mandates for financial curriculum in high schools to test the effects of financial education on future savings.[3] As well, Duflo and Saez (2003) employ randomized monetary incentives for participation in a savings seminar to investigate the effects of financial information on individual and peer savings outcomes. Such unbiased studies using randomized or natural experiments are limited in number given the importance noted above that policy makers place on financial information interventions.

The remainder of the paper is organized as follows: Section 2 presents the design of the field study, and discusses the methodology employed for eliciting time preferences. Section 3 presents the results in two broad sections. First, analysis of the relationship between take-up of the short credit counseling session and measured time preference parameters is presented; and second, prior financial knowledge and financial experience and their relative impacts on take-up are analyzed. Section 4 concludes, discussing the implications of this paper for future research on financial information interventions.

2 Design of Field Study

Our results are based on a unique field study measuring time preferences both for individuals who do and do not decide to participate in a financial education program.

[3]It is worth noting that these two studies, using the same identification strategy, come to broadly different conclusions as to the effects of financial education on savings behavior. Whereas Bernheim et al. (2001) find that mandated education increases savings, Cole and Shastry (2007) find that mandated financial education has no impact on savings.

2.1 Design of Financial Education Program

The study was conducted at a Volunteer Income Tax Assistance (VITA) site in Roxbury, a neighborhood in Boston, Massachusetts.[4] Between January and April of 2007, a large credit counseling corporation was asked to offer a short credit counseling session to all individuals entering the Roxbury VITA site.[5] The credit counseling session included a free credit report from one of the three major credit bureaus (including an individual's own Fair Issac Corporation (FICO) credit score) along with a short overview of how to read a credit report (for information about credit reports, see Avery et al. (2003)). The credit session also included several key steps individuals could take to improve or maintain their credit score.[6] The counseling program was designed by the large credit counseling corporation's public outreach group to be of value to most VITA taxpayers including individuals with credit, individuals without credit histories and individuals who already knew their FICO score. Counseling sessions were one-on-one and implemented by professional credit counselors from the large corporation and volunteers who they had trained.

Credit reports were provided to individuals for free and obtained under a special credit scoring license that would not negatively impact individuals' FICO credit scores. The counseling session itself was designed to take less than 15 minutes per person and was generally received while an individual was already waiting for tax filing assistance. Waiting times at the Roxbury VITA site were frequently in excess of two hours and so opportunity costs in this environment should be quite low.[7] Additionally, concerns

[4]There are currently 23 VITA sites in and around Boston, MA. Coordinated by a city-wide coalition of government and business leaders, VITA sites provide free tax preparation assistance to low-to-moderate income (LMI) households. Taxes are prepared by volunteers throughout tax season, from late January to mid-April each year.

[5]The program was implemented under a cooperative agreement between the City of Boston and the counseling firm.

[6]Professional credit counselors generally employ a variety of techniques to quickly improve the credit scores of new clients. These techniques help counselors to retain clients and potentially allow for lower interest rates in debt consolidation.

[7]By site rules, individuals who did not wait on-site and missed their name being called were sent to the bottom of the tax-payer registry.

about the potential costs of identity theft are expected to be negligible since individuals come to the VITA site voluntarily and entrust all their personal information to site staff for tax filing purposes.

2.2 Field Study Procedure

The exact procedure in the field study was as follows: first, all taxpayers entering the Roxbury VITA site signed a taxpayer registry. Taxes were filed by volunteer tax preparers on a first-come first-serve basis with names called from the registry. Each individual was asked at registration whether they wanted to receive a free, short credit counseling session (including access to their credit report and credit score) while waiting for a volunteer to help them with their taxes. Individuals could choose to receive the short counseling session any time between entering and leaving the site.

Second, independent of whether they chose to take up the counseling session, individuals received a preparatory packet with forms for their taxes, a survey with some socio-demographic and other information, and a set of multiple price lists designed to elicit individual time preferences. Individuals were given both verbal and written explanations of how to fill in the price lists and how the payment mechanism for the price lists would work (more details about the price lists are given below).

Third, individuals filled out the surveys and completed the price lists. Those who took up the counseling program then received a short one-on-one credit counseling session. Individuals were informed beforehand that the session would take no more than 15 minutes. Upon completion of the credit counseling session, a tax preparation volunteer helped the individual to file his or her taxes. Individuals who decided to receive free credit counseling did not lose their place in the taxpayer registry on the occasion their name was called prior to completing the counseling session. All individuals were informed of this in advance.

We acquired the following information for 778 individuals: (i) whether they par-

ticipated in the short credit counseling program, (*ii*) a useable measure of their time preferences from the above mentioned price lists (see below), and (*iii*) their income, age and number of dependents from their tax filing. Additionally, we obtained information on the day when individuals were offered the financial education program in the VITA site. This enables us to control for day-specific waiting times and potential social interaction effects. (*iv*) For a substantial number, though not all, of the individuals in the study, we also have a complete record of the socio-demographic characteristics reported from the preparatory survey mentioned above. This survey included questions on the individual's gender, race and education.

The survey also included questions on prior financial experience and financial knowledge. Individuals were asked if they had a bank account, if they had a credit card and the outstanding balances on all credit cards. Responses are taken as measures of financial experience. Individuals were additionally asked: *"Do you know what a credit score is?"* Individual responses are taken as a measure of prior financial knowledge and are used to determine whether time preferences correlate with information acquisition prior to the field study. In Section 3.3, we examine whether this prior financial knowledge and financial experience can explain the association between time preferences and the decision to participate in the credit counseling program.

Table 1 presents summary statistics for the field study participants. The average individual in the field study is around 38 years of age, African-American, female, has no college experience, adjusted gross income of around $17,000, and 0.5 dependents (see Panel A of Table 1). As noted above, for some individuals, values for gender, race and educational attainment are not available. For such individuals, gender, race and education indicator variables are imputed as the value of the majority and this imputation is controlled for in our analysis.[8] Panel A of Table 1 shows the proportion of individuals with imputed socio-demographic characteristic values.

[8]All results presented in Section 3 are maintained when only individuals with complete socio-demographic information are analyzed (see Section 3.4).

Panel B of Table 1 reports measures of financial knowledge and financial experience. Complete financial data is only available for a subsample of 521 individuals ("Financial Sample"). The average participant knows what a credit score is, has a bank account but not a credit card and has total card balances of less than \$1000[9]. A small number of individuals with credit cards (32 of 204 cardholding individuals) do not report their credit card balances. As with the demographic characteristics, we impute this value as the balances of the majority of cardholders and control for non-reporting individuals in our analysis. The proportion of non-reporting individuals is also shown in Panel B of Table 1.

[Table 1 about here]

As evidenced by the data presented in Table 1, the field study focused on low-to-moderate-income (LMI) individuals. This non-standard subject pool is of particular interest for the research question at hand, first, as there are very few experimental studies focusing solely on the financial behavior of LMI families in developed countries (an exception is Eckel et al., 2005). And, second, much of the efforts to increase financial literacy are targeted to LMI households (apparent by the counseling program initiated by the City of Boston analyzed in this paper). Given the selection of the sample, however, care must be taken in extrapolating broadly from the results presented below.

2.3 Measuring Time Preferences

2.3.1 Methodology

Individual decisions on financial information acquisition are correlated to time preference measures obtained using incentive-compatible experimental methods. Experimental procedures for eliciting time preference parameters are employed in a variety

[9]Individuals without credit cards have total card balances coded as \$0.

of contexts (for similar approaches, see Harrison et al., 2002; McClure et al., 2004; Bettinger and Slonim, 2007; Tanaka et al., 2007, and for a survey on measuring time preferences, see Frederick et al. (2002)). Linking experimentally elicited time preference parameters to real-world outcomes, however, is a relatively novel use of such parameter measures (see Ashraf et al., 2006; Meier and Sprenger, 2009a).

In the field study, individuals arriving at the VITA site were given three multiple price lists and asked to make various choices between a smaller reward ($\$X$) in period t and a larger reward ($\$Y > \$X$) in period $t + \tau > t$. In total, individuals were given 22 choices over three different time frames: in two time frames t is the present ($t = 0$) and τ is either one ($\tau = 1$) or six months ($\tau = 6$). In the third time frame, t is in six months ($t = 6$) and τ is one month ($\tau = 1$). In the price lists employed, $\$Y = \$50$ and $\$X$ was varied from \$49 to \$14 (see the instructions in Appendix A.1) and the order of the three price lists was randomized. This methodology yields measures that are highly correlated with time preference measures derived from other methodologies (e.g., Reuben et al., 2008; Chabris et al., 2008). Time preference measures obtained from price lists have also been shown to be stable at the individual level over time (see Meier and Sprenger, 2009b).

Experimental approaches generally encourage the truthful revelation of individual preferences by placing monetary stakes on the choices individuals make. In order to make experimental responses incentive compatible, 10 percent of individuals were randomly paid one of their choices. This was done with a raffle ticket, which subjects took at the end of their tax filing and which indicated which choice would be effective (if at all).

To ensure credibility of the payments, money orders for the winning amounts were filled out on the spot in the presence of the participants, put in labeled, pre-stamped envelopes and sealed. The payment was guaranteed by the Federal Reserve Bank of Boston and individuals were informed that they could always return to the head of

the VITA site where the study was implemented to report any problems receiving the payments. Individuals were informed that winning money orders would be sent by mail to the winner's home address on the same day as the experiment (if $t = 0$), or in one, six, or seven months, depending on the winner's previous experimental choice. Money orders were sent by mail to equate transaction costs across present and future payments. Such a payment procedure is similar to an experimental front-end-delay design (see Harrison et al., 2005).

2.3.2 Time Preference Measure

The experimental setup enables us to measure an *individual discount factor* (IDF). We estimate monthly *IDF*s for three different time frames by looking at the point, X^*, at which an individual switches from opting for the smaller, sooner payment to the larger, later payment in a given price list. That is, a discount factor is taken from the last point at which an individual prefers the sooner, smaller payment. For example, if an individual prefers \$45 today over \$50 in one month, but prefers \$50 in one month over \$40 today, we take \$45 as the switching point and the corresponding monthly discount factor of 0.90. Therefore, individual discount factors are calculated as:

$$IDF = \sqrt[\tau]{X^*/Y}$$

Making these calculations for the three multiple price lists yields three discount measures, $IDF_{t,\tau}$: $IDF_{0,1}$, $IDF_{0,6}$, $IDF_{6,1}$. The average of the calculated monthly discount factors, $\overline{IDF}$, is used in the main analysis. The influence of the individual discount factors on the participation decision is analyzed in the appendix.

Importantly, the research question at hand needs a reliable measure of the heterogeneity in *IDF*s across individuals and not necessarily precise point estimates of the level of the *IDF*. The employed methodology does allow for the identification of differences in patience across individuals. The resulting parameter measures should not, however, be interpreted as the parameter measures governing all intertemporal

decision making (see Frederick et al., 2002, for a general discussion of the precision of experimentally measured time preference parameters). Furthermore, the price lists employed do not elicit actual point estimates of the *IDF* but rather ranges of where the *IDF* lie (see Coller and Williams, 1999; Harrison et al., 2005, for details). In the above example, the individual's actual switching point lies somewhere between \$40 and \$45. As such, the monthly IDF lies in the interval $(0.80, 0.90)$. The interval within which our three discount measures ($IDF_{0,1}$, $IDF_{0,6}$, $IDF_{6,1}$) lie can be calculated. When presenting results, we ensure that our findings are maintained in interval regressions (Stewart, 1983) using the range of possible *IDF*s.

Among our sample of LMI individuals, we find an average monthly individual discount factor of 0.82. This discount factor may seem low, but it is in line with previous research, which tends to find low discount factors in experimental studies (see Frederick et al., 2002). Decisions on payday loans or used cars imply, however, often much lower discount factors for subprime borrowers than measured by our experiment (e.g., Skiba and Tobacman, 2007; Adams et al., 2009).

It is of independent interest to examine the relationship between socio-demographic factors and an individual's measured discount factor. Table 2 presents regressions using the discount factor as the dependent variable. Column (1) and Column (2) show tobit models where the dependent variable is the average discount factor ($\overline{IDF}$). Column (3) and Column (4) show interval regressions (Stewart, 1983) where the dependent variable is the interval measure of an $IDF_{t,\tau}$. For both dependent variables, we either control for basic, exogenous demographic characteristics or a longer list of control variables, which includes income and education. In the interval regressions, the two relevant aspects of the price list from which $IDF_{t,\tau}$ is measured are controlled for: whether the price list involves the present, *Has Present* (=1), and whether the price list involves a six month or one month delay, *Six Month Delay* (=1). As each individual has three observations of $IDF_{t,\tau}$ measured from the three separate price lists, standard errors

are clustered on the individual level.

[Table 2 about here]

Examining the interval regressions, the result show that, as in Harrison et al. (2002), education and the structure of the price list matter for the measured discount factor. Individuals who have college experience exhibit higher discount factors. The measured discount factor decreases when the present is involved and increases with the delay. Such a pattern is consistent with non-exponential discounting (see Frederick et al., 2002). In addition, the results show consistently across all specifications that individuals who earn higher income and females are significantly more patient.

2.3.3 Measurement Issues

The applied method to measure time preferences with incentivized choice experiments as described above has many advantages over other approaches (Frederick et al., 2002). However, the method also has several challenges which have to be addressed (for a complete discussion see Harrison et al., 2005).

First, in order to measure an *IDF*, an individual must exhibit a unique switching point in each price list. Around 11% of individuals do not exhibit a unique switching point in one or more price lists. In the main analysis we focus on the 778 individuals who show a unique switching point in all price lists. When observations from individuals with multiple switching points are included in a robustness test, using the first switching point to calculate each *IDF*, the results are maintained (see Section 3.4).

Second, outside borrowing and lending opportunities might drive experimental responses (Harrison et al., 2005). The implied interest rates of the price lists employed are generally extremely high such that individuals should prefer later payments in nearly all situations. That participants do not uniformly choose later payments suggests that outside opportunities are not critically impacting experimental results. Meier and Sprenger (2009a) show that individual credit limits are uncorrelated with measured

discount factors indicating that borrowing constraints also have limited effect on participants' experimental responses. We will also control for whether individuals have a credit card to see whether credit constraints affect the results - they don't.

Third, the measurement of time preference parameters by observing individuals' switching points in price lists implicitly assumes that utility is linear over the payments in question. This procedure simplifies the analysis considerably and is consistent with expected utility theory, which implies that consumers are approximately risk neutral over small stakes outcomes (Rabin, 2000).[10] However, parameters estimated from price lists may also capture differences across individuals in the degree of curvature of the utility function (Andersen et al., 2008). We therefore test whether differences in risk aversion affect the results using a question on general risk attitudes previously validated with a large, representative sample (Dohmen et al., 2005; Jaeger et al., 2009). The question reads as follows: *"How willing are you to take risks in general? (on a scale from "unwilling" to "fully prepared").* Controlling for these risk attitudes does not affect the results of this paper (see Section 3.4).

3 Results

Of all individuals offered the short credit counseling session, 55 percent opted to acquire financial information, while the rest declined. The effect of individual time preferences on this decision is presented in three steps. First, we present descriptive statistics showing differences between participants and non-participants both in time preferences and in demographic and financial experience variables. Second, the association between time preferences and the participation decision is investigated in a multivariate regression analysis controlling for critical socio-demographic characteristics. Third, we present the association between time preferences and prior financial knowledge and the effect of time preferences on take-up of the counseling program controlling for prior

[10]It is, of course, debatable whether such payments represent small stakes for our sample.

financial knowledge and measures of financial experience.

3.1 Descriptive Statistics

In addition to summary statistics for the entire sample, Table 1 presents separate summary statistics for participating and non-participating individuals along with t-tests of equal means and corresponding p-values. Panel A of Table 1 indicates a clear difference in time preferences between individuals who acquire financial information by taking up the counseling program and those who decide not to become informed. Individuals who choose to participate in the counseling session have an $\overline{IDF}$ of 0.85, compared to an $\overline{IDF}$ of 0.78 for individuals who choose not to participate ($p < 0.001$). Figure 1 shows the cumulative distribution of the $\overline{IDF}$s for the two groups. The figure illustrates that individuals who select to acquire information have substantially higher $\overline{IDF}$s.To put it differently, individuals who selected into credit counseling chose the \$50 in the future an average of 12 times out of 22 choices, while individuals who selected not to receive counseling chose the larger, later reward only 9 times.

[Figure 1 about here]

Table 1 also compares other characteristics of the individuals who choose to receive the short counseling session and those who decline the offer. Comparison of the two self-selected groups shows that they hardly differ in observable basic demographic characteristics or income. Participants and non-participants do, however, differ starkly in educational attainment, prior financial knowledge and financial experience. Individuals who take up the counseling program are more likely to have some college experience ($p < 0.01$). Individuals who take up the counseling program are more likely to know what a credit score is ($p < 0.01$), are somewhat more likely to hold a credit card ($p < 0.10$), and are more likely to report credit card debt in excess of \$1000 ($p < 0.05$).

Education could be a proxy for cognitive abilities, which might influence measured time preferences (e.g. Benjamin et al., 2006; Burks et al., 2009) and so is controlled for

in our analysis. Importantly, another normally used proxy for cognitive ability, personal income, seems not to differ between the two groups. Financial experience (e.g., understanding of interest rates) may affect both our measured discounting parameters and an individual's desire to obtain their credit report. Additionally, prior financial knowledge (e.g., previous investments in financial information) should be correlated with time preferences and may also impact participation decisions. In addition to controlling for educational level and income as proxies for cognitive ability and knowledge, we explicitly control in Section 3.3 for prior financial knowledge and financial experience.

3.2 Time Preferences and Participation

The descriptive statistics suggest a substantial correlation between time preferences and the decision to participate in the credit counseling program. Table 3 presents logit regressions where the dependent variable is 1 if the individual participated in the credit counseling program and 0 otherwise. In Column (1) of Table 3, the basic association between $\overline{IDF}$ and participation is presented. To this basic specification, Column (2) adds exogenous demographic characterisitics age, race and gender; and Column (3) adds socio-demographic characteristic controls that may be influenced by time preferences: educational attainment, income and number of dependents. In all regressions, we control for the day individuals were offered the counseling program and for whether or not values for race, gender and education were imputed (coefficients not reported).

Across specifications, the relationship between time preferences and take-up of the counseling program is found to be both stable and important. Especially, the addition of an extensive set of control variables does not affect the coefficient of the discount factor substantially. More patient individuals are significantly more likely to participate in the credit counseling program. Controlling for socio-demographics and day

specific effects, a marginal effect of 0.504 is calculated. That is, a one standard deviation increase in $\overline{IDF}$ is associated with an increased probability of participation of roughly 8.5 percent. In addition to time preferences, certain socio-demographic characteristics are found to be correlated with take-up. More educated individuals are more likely to participate in credit counseling, and a concave relationship between age and participation is observed. The association between time preferences and participation in the credit counseling program can also been found if one adds an indicator variable for individual participation, *Counseling (=1)*, as an independent variable in an interval regression (see Table A1 in the appendix). Also each of the three discount factor measures correlate independently with credit counseling participation (see Table A2 in the appendix).

[Table 3 about here]

In sum, choosing to receive a credit counseling session is positively correlated with patience. This association holds when controlling for exogenous demographic variables and individual characteristics potentially correlated with time preferences. In the following subsection we analyze whether time preferences are also associated with prior financial information acquisition and whether this prior knowledge and financial experience can explain the relationship between time preference and the decision to acquire information in our field study.

3.3 Time Preferences, Prior Knowledge and Experience

Time preferences should not only explain who will select into becoming informed in our field study, but also correlate with the acquisition of personal financial information prior to the field study. To test this claim, we analyze responses to a simple question, in which individuals self-report their knowledge about credit scoring. We create a dummy, *Know what score is*, which is set equal to 1 for individuals' reporting that they know

what a credit score is, and 0 otherwise. Of the 521 field study participants for whom complete financial information was obtained, a substantial portion (around 40 percent) did not know what a credit score was. Importantly, this prior financial knowledge is significantly correlated with individual time preferences. The correlation between $\overline{IDF}$ and knowledge of credit scores is positive and significant ($\rho = 0.077$, $p \leq 0.05$). More patient individuals are more likely to have previously acquired financial information and are more likely to acquire information in the field study.

Prior financial information acquisition may impact participation choices in the field experiment. Though the credit counseling program was designed to be of value to most taxpayers it is possible that individuals without prior financial knowledge are less aware of the benefits of participation. It is therefore important to control for the level of prior knowledge when testing whether more patient individuals are willing to acquire financial information in the field study. Additionally, financial experience may also impact participation decisions as the value of the counseling session might, for example, differ for those with or without credit card balances. And, financial experience and knowledge could potentially also affect the discount factors measured with the multiple price lists. More financially advanced individuals, with experience in calculating interest rates, may appear more patient than others if they arbitrage the high interest rates in the price lists.[11] Controlling for prior financial knowledge and financial experience (along with controlling for education and income) provides an important test of whether a third factor such as financial experience, knowledge or acumen is affecting both participation decisions and measured discount factors.

[Table 4 about here]

Table 4 presents the association between time preferences and participation controlling for prior financial knowledge and financial experience. Column (1) of Table 4

[11] However, choices in experiments with monetary rewards also highly correlate with measures based on non-monetary primary rewards or response times (see section 2.3.1).

repeats the specification of Column (3) of Table 3 for the subsample of individuals for whom complete financial information is obtained ("Financial Sample"). This regression provides a baseline for this sample against which to test the potential impacts of prior financial knowledge and financial experience. Column (2) of Table 4 additionally controls for prior financial knowledge, Column (3) controls for financial experience measured as bank account and credit card holdership and high levels of credit card debt. Column (4) controls jointly for all available measures of prior knowledge and financial experience. As before, all regressions control for socio-demographics, including income and education, the day of study and whether race, gender or education values were imputed.

Our measures of financial experience and financial knowledge have no individual impact on participation decisions. Taken together, we cannot reject the hypothesis that such measures have zero combined correlation with participation (Wald Statistic $(\chi^2_4) = 4.44,\ p = 0.35$). Furthermore, the correlation between participation and patience is virtually unchanged with the addition of these measures of financial knowledge and financial experience. More patient individuals remain more likely to participate in the credit counseling program controlling for prior financial knowledge and financial experience. We do not find support for the notion that a third factor such as financial experience, knowledge or acumen is driving the observed correlation between patience and financial information acquisition.

3.4 Robustness

To arrive at the above results several assumptions and restrictions were made with regards to the measurement of time preferences and we imputed some socio-demographic variables. In this section, we relax these restrictions and eliminate these imputations to ensure the results are maintained.

[Table 5 about here]

Multiple Switchers: The measurement of $\overline{IDF}$ requires that an individual has a unique switching point in each price list (see Section 2.3.3). Panel A of Table 5 repeats the analysis of Table 3 including individuals with multiple switching points. Each $IDF_{t,\tau}$ is calculated from an individual's first switching point in the relevant price list and $\overline{IDF}$ is again taken as the average of these measures. Including individuals with multiple switch points in the analysis does not affect the result that more patient individuals are more likely to participate in the short credit counseling program.

Missing Socio-Demographic Variables: In the main analysis, missing values for race, gender and educational attainment are imputed using the value of the majority. Panel B of Table 5 repeats the specifications of Table 3 including only individuals with complete socio-demographic characteristics. The results are virtually unchanged.

Risk Attitudes: The employed methodology for measuring an IDF from price list responses assumes that utility is linear over the price list payments. As price list choices may also capture differences in the curvature of the utility function across individuals, risk preferences may affect the measured IDF. Panel C in Table 5 examines a subsample of individuals for whom a measure of risk attitudes from a generalized risk question is available (for wording of the question see Section 2.3.3). Controlling for risk attitudes, the obtained relationship between participation and time preferences is maintained.

Expectation of Moving: Payments of price list earnings are mailed. Though this methodology is employed to equate transaction costs across present and future payments, some individuals may leave their current residence prior to the arrival of their earnings. Though this should not affect price list responses if individuals expect to remain in their current residence, individuals who expect to move may prefer sooner experimental payments. To control for this possibility, the survey material noted in Section 2.2 included the following question: *"Do you expect to move in the next 7 months?"*. In Panel D of Table 5, we control for responses to this question for the

subsample of responding individuals to test whether expectations of moving impact our observed results. Expectations of moving do not affect the observed correlation between time preferences and financial information acquisition.

In sum, more patient individuals are more likely to acquire financial information through the short credit counseling program offered in the field study. This result is maintained when controlling for socio-demographic characteristics and when accounting for the interval nature of our time preference measures. More patient individuals are also more likely to have prior knowledge of credit scoring. Prior knowledge and financial experience, however, cannot explain the observed correlation between patience and financial information acquisition. The results are robust to relaxing a variety of sample restrictions; allowing for non-unique price list switching points; and controlling for risk attitudes and expectations of moving.

4 Discussion and Conclusions

This paper presents evidence that time preferences are highly correlated with the acquisition of financial information. Methodologically, we make the important step of linking experimentally-measured discount factors to a very relevant real-life decision for low-to-moderate individuals: participating in a financial literacy program. In this field study we show that more patient individuals are more likely to participate in such a credit counseling program. We additionally show that more patient individuals have higher levels of financial information prior to the field study but that our results are maintained when controlling for this prior financial knowledge and measures of financial experience.

The results have implications for previous and future evaluation efforts of financial education programs. Participants in educational programs were previously suspected to be a selection of individuals, biasing evaluation studies and motivating experimental studies. The results in this paper show a mechanism for the selection process: selection

on time preferences. This gives an indication of the direction of the bias. Most previous results on the positive effects of financial education on behavior (for examples of studies on credit counseling, see Elliehausen et al., 2007; Hartarska and Gonzalez-Vega, 2006) are likely *upwards biased*. The more patient individuals who participate will have generally better financial outcomes regardless of the educational programs. The results strongly suggest that more randomized evaluation studies have to be undertaken to support the claim by policy makers and economists that financial education programs are effective.

The results of this paper also help answer the question of why, if financial information is so important, many individuals do not become financially literate. Acquiring financial information can be viewed as an investment. Some groups of individuals may find the investment to be unattractive. Impatient individuals are one critical subgroup as they heavily discount the benefits of being financially literate. If individuals' preferences are guiding them to financial illiteracy, then policy makers must critically examine the costs and benefits to consumers of financial programs in order to make information acquisition attractive to target populations.

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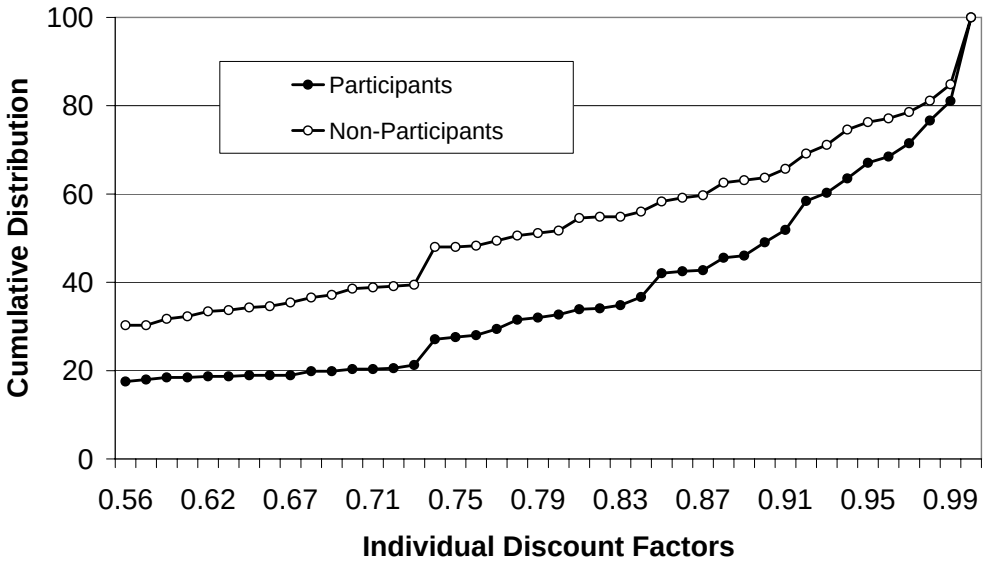

Figure 1: Cumulative Distribution of $\overline{IDF}$

Table 1: Summary Statistics

Variable	Mean (s.d)	Mean (s.d)	Mean (s.d.)	t-statistic	p-value
Panel A: Time Preference and Socio-demographics ("Primary Sample")					
	Total N = 778	No Counseling N = 350	Counseling N = 428		
$\overline{IDF}$	0.82	0.78	0.85	-5.64	0.00
	(0.17)	(0.17)	(0.16)		
Counseling (=1)	0.55	0.00	1.00	.	.
	(0.50)	(0.00)	(0.00)		
Age	38.31	39.43	37.39	1.88	0.06
	(15.03)	(16.34)	(13.82)		
African-American (=1)	0.71	0.70	0.72	-0.59	0.56
	(0.45)	(0.46)	(0.45)		
Race Imputed (=1)	0.07	0.05	0.09	-2.01	0.04
	(0.26)	(0.22)	(0.28)		
Female (=1)	0.66	0.65	0.68	-0.87	0.39
	(0.47)	(0.48)	(0.47)		
Gender Imputed (=1)	0.08	0.08	0.08	0.15	0.88
	(0.27)	(0.27)	(0.27)		
College Exper. (=1)	0.40	0.33	0.45	-3.26	0.00
	(0.49)	(0.47)	(0.50)		
Educ. Imputed (=1)	0.11	0.09	0.12	-1.15	0.25
	(0.31)	(0.29)	(0.32)		
Adj. Gross Income	16,862.34	16,091.97	17,492.32	-1.42	0.16
	(13,704.84)	(13,496.38)	(13,856.87)		
No. of Dependents	0.48	0.44	0.52	-1.37	0.17
	(0.82)	(0.78)	(0.85)		
Panel B: Financial Knowledge and Financial Experience ("Financial Sample")					
	Total N = 521	No Counseling N= 221	Counseling N = 300		
Score Knowledge (=1)	0.60	0.54	0.64	-2.24	0.03
	(0.49)	(0.50)	(0.48)		
Bank Account (=1)	0.77	0.80	0.75	1.28	0.20
	(0.42)	(0.40)	(0.43)		
Credit Card (=1)	0.39	0.35	0.42	-1.73	0.08
	(0.49)	(0.48)	(0.49)		
Card Debt $\geq$ \$1000	0.13	0.09	0.15	-2.14	0.03
	(0.33)	(0.29)	(0.36)		
Debt Not Reported	0.06	0.05	0.07	-0.95	0.34
	(0.24)	(0.22)	(0.26)		

Table 2: Time Preferences and Socio-Demographic Characteristics

	(1)	(2)	(3)	(4)
Dependent Variable:	$\overline{IDF}$		*Interval of* $IDF_{t,\tau}$	
Age	-0.000	-0.005*	-0.001	-0.008**
	(0.003)	(0.003)	(0.003)	(0.004)
Age^2	-0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
African-American (=1)	-0.003	-0.004	0.001	-0.005
	(0.016)	(0.015)	(0.019)	(0.018)
Female (=1)	0.074***	0.064***	0.098***	0.082***
	(0.015)	(0.015)	(0.018)	(0.018)
College Experience (=1)		0.034**		0.042**
		(0.015)		(0.018)
ln(Adjusted Gross Income)		0.028***		0.029***
		(0.007)		(0.009)
Number of Dependents		0.015*		0.018
		(0.009)		(0.011)
Six Month Delay (=1)			0.163***	0.162***
			(0.007)	(0.007)
Has Present (=1)			-0.074***	-0.074***
			(0.009)	(0.009)
Constant	0.783***	0.589***	0.708***	0.506***
	(0.060)	(0.081)	(0.075)	(0.098)
Day-Specific Effects	Yes	Yes	Yes	Yes
Log-Likelihood	55.881	71.685	-6.4e+03	-6.4e+03
# of Observations	778	778	2334	2334
# of Individuals	778	778	778	778

Notes: Columns (1) and (2): Tobit regressions. Dependent variable: $\overline{IDF}$. Columns (3) and (4): Interval regressions (Stewart, 1983). Dependent variable: Interval of $IDF_{t,\tau}$ measured from one of three price lists: $IDF_{0,1}$ $IDF_{0,6}$ $IDF_{6,1}$. Standard errors clustered on individual level in parentheses. Coefficients of dummies for day of study, imputed gender, imputed race, imputed education omitted from table.
Level of significance: $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 3: Time Preferences and Counseling Participation

	(1)	(2)	(3)
Dependent Variable:	*Credit Counseling Participation (=1)*		
$\overline{IDF}$	2.399***	2.277***	2.041***
	(0.484)	(0.507)	(0.518)
Age		0.109***	0.082**
		(0.037)	(0.039)
Age^2		-0.001***	-0.001**
		(0.000)	(0.000)
African-American (=1)		0.337*	0.329*
		(0.193)	(0.195)
Female (=1)		0.128	0.050
		(0.174)	(0.181)
College Experience (=1)			0.367**
			(0.180)
ln(Adjusted Gross Income)			0.059
			(0.080)
Number of Dependents			0.137
			(0.103)
Constant	-1.753***	-3.820***	-3.905***
	(0.499)	(0.911)	(1.038)
Day-Specific Effects	Yes	Yes	Yes
Log-Likelihood	-488.016	-475.178	-471.614
N	778	778	778

Notes: Logit regressions. Dependent variable: 1 if individual participated in credit counseling program, 0 otherwise. Robust standard errors in parentheses. Coefficients of dummies for day of study, imputed gender, imputed race, imputed education omitted from table.
Level of significance: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table 4: Time Preferences, Prior Knowledge, and Financial Experience

	(1)	(2)	(3)	(4)
Dependent variable:	*Credit Counseling Participation (=1)*			
$\overline{IDF}$	1.678**	1.665**	1.574**	1.569**
	(0.663)	(0.664)	(0.670)	(0.671)
Credit Score Knowledge (=1)		0.237		0.205
		(0.217)		(0.219)
Bank Account (=1)			-0.274	-0.275
			(0.269)	(0.269)
Credit Card (=1)			0.042	0.030
			(0.263)	(0.263)
Credit Card Debt $\geq$ \$1000			0.536	0.505
			(0.373)	(0.374)
Credit Card Debt Not Reported			0.727	0.738
			(0.474)	(0.475)
Age	0.076	0.078	0.075	0.077
	(0.057)	(0.057)	(0.059)	(0.059)
Age^2	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
African-American (=1)	0.391*	0.384	0.363	0.357
	(0.236)	(0.237)	(0.238)	(0.238)
Female (=1)	0.052	0.017	0.036	0.007
	(0.230)	(0.235)	(0.234)	(0.239)
College Experience (=1)	0.360	0.307	0.358	0.315
	(0.228)	(0.231)	(0.231)	(0.234)
ln(Adjusted Gross Income)	0.088	0.083	0.072	0.071
	(0.105)	(0.105)	(0.108)	(0.108)
Number of Dependents	0.156	0.153	0.152	0.149
	(0.123)	(0.124)	(0.126)	(0.126)
Constant	-3.398**	-3.489**	-2.983**	-3.087**
	(1.338)	(1.357)	(1.385)	(1.404)
Day-Specific Effects	Yes	Yes	Yes	Yes
Log-Likelihood	-308.258	-307.649	-305.268	-304.825
N	521	521	521	521

Notes: Logit regressions. Dependent variable: 1 if individual participated in credit counseling program, 0 otherwise. Robust standard errors in parentheses. Based on "Financial Sample". Coefficients of dummies for day of study, imputed gender, imputed race, imputed education omitted from table.

Level of significance: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table 5: Robustness: Additional Controls and Restrictions

	(1)	(2)	(3)
Dependent Variable:	*Counseling Participation (=1)*		
Exogenous Demographic Controls	No	Yes	Yes
Additional Socio-Demographic Controls	No	No	Yes
Day Specific Effects	Yes	Yes	Yes
Panel A: Including Individuals with Multiple Switch Points			
$\overline{IDF}$	2.338***	2.268***	2.063***
	(0.470)	(0.488)	(0.495)
Multiple Switcher (=1)	-0.236	-0.261	-0.203
	(0.239)	(0.252)	(0.252)
N	872	872	872
Panel B: Excluding Individuals with Missing Control Variables			
$\overline{IDF}$	2.579***	2.582***	2.357***
	(0.557)	(0.587)	(0.603)
N	618	618	618
Panel C: Including Risk Attitudes Measure			
$\overline{IDF}$	2.076***	1.747***	1.390**
	(0.566)	(0.600)	(0.628)
Risk Attitudes (0-10)	0.041	0.041	0.044
	(0.031)	(0.033)	(0.033)
N	603	603	603
Panel D: Including Expectations of Moving			
$\overline{IDF}$	2.326***	2.183***	1.958***
	(0.511)	(0.535)	(0.546)
Expect to Move (=1)	0.223	0.199	0.202
	(0.196)	(0.206)	(0.207)
N	713	713	713

Notes: Logit regressions. Dependent variable: 1 if individual participated in credit counseling program, 0 otherwise. Robust standard errors in parentheses. Control variables include age, age squared, gender, race, college experience, number of dependents, adjusted gross income (in natural log), day of study and indicator variables for imputed gender, race, and education. Panel C: Risk attitudes are measured from the question *"How willing are you to take risks in general? (on a scale from 0 'unwilling' to 10 'fully prepared')."* Panel D: Expectations of moving are measured from the question *"Do you expect to move in the next 7 months? Yes or No."*
Level of significance: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

A Appendix

A.1 Instructions

As a tax filer at this Volunteer Income Tax Assistance site you are automatically entered in a raffle in which you could win up to $50. Just follow the directions below:

How It Works: In the boxes below you are asked to choose between smaller payments closer to today and larger payments further in the future. For each row, choose one payment: either the smaller, sooner payment or the later, larger payment. When you return this completed form, you will receive a raffle ticket. If you are a winner, the raffle ticket will have a number on it from 1 to 22. These numbers correspond to the numbered choices below. You will be paid your chosen payment. The choices you make could mean a difference in payment of more than $35, so CHOOSE CAREFULLY!!!

RED BLOCK (Numbers 1 through 7): Decide between payment **today** and payment in **one month**
BLACK BLOCK (Numbers 8 through 15): Decide between payment **today** and payment in **six months**
BLUE BLOCK (Numbers 16 through 22): Decide between payment in **six months** and payment in **seven months**

Rules and Eligibility: For each possible number below, state whether you would like the earlier, smaller payment or the later, larger payment. Only completed raffle forms are eligible for the raffle. All prizes will be sent to you by normal mail and will be paid by money order. One out of ten raffle tickets will be a winner. You can obtain your raffle ticket as soon as your tax filing is complete. You may not participate in the raffle if you are associated with the EITC campaign (volunteer, business associate, etc.) or an employee (or relative of an employee) of the Federal Reserve Bank of Boston or the Federal Reserve System.

[Red Block; $t = 0$, $\tau = 1$]

TODAY VS. ONE MONTH FROM TODAY WHAT WILL YOU DO IF YOU GET A NUMBER BETWEEN 1 AND 7? Decide for **each** possible number if you would like the smaller payment for sure **today** or the larger payment for sure in **one month**? Please answer for each possible number (1) through (7) by filling in one box for each possible number.

Example: If you prefer $49 today in Question 1 mark as follows: ✓ $49 today or $50 in one month
If you prefer $50 in one month in Question 1, mark as follows: $49 today or ✓ $50 in one month

If you get number (1): Would you like to receive $49 **today** or $50 in **one month**
If you get number (2): Would you like to receive $47 **today** or $50 in **one month**
If you get number (3): Would you like to receive $44 **today** or $50 in **one month**
If you get number (4): Would you like to receive $40 **today** or $50 in **one month**
If you get number (5): Would you like to receive $35 **today** or $50 in **one month**
If you get number (6): Would you like to receive $29 **today** or $50 in **one month**
If you get number (7): Would you like to receive $22 **today** or $50 in **one month**

[Black Block; $t = 0$, $\tau = 6$]

TODAY VS. SIX MONTHS FROM TODAY WHAT WILL YOU DO IF YOU GET A NUMBER BETWEEN 8 AND 15? Now, decide for **each** possible number if you would like the smaller payment for sure **today** or the larger payment for sure in **six months**? Please answer each possible number (8) through (15) by filling in one box for each possible number.

If you get number (8): Would you like to receive $49 **today** or $50 in **six months**
If you get number (9): Would you like to receive $47 **today** or $50 in **six months**
If you get number (10): Would you like to receive $44 **today** or $50 in **six months**
If you get number (11): Would you like to receive $40 **today** or $50 in **six months**
If you get number (12): Would you like to receive $35 **today** or $50 in **six months**
If you get number (13): Would you like to receive $29 **today** or $50 in **six months**
If you get number (14): Would you like to receive $22 **today** or $50 in **six months**
If you get number (15): Would you like to receive $14 **today** or $50 in **six months**

[Blue Block; $t = 6$, $\tau = 1$]

SIX MONTHS FROM TODAY VS. SEVEN MONTHS FROM TODAY WHAT WILL YOU DO IF YOU GET A NUMBER BETWEEN 16 AND 22? Decide for **each** possible number if you would like the smaller payment for sure in **six months** or the larger payment for sure in **seven months**? Please answer for each possible number (16) through (22) by filling in one box for each possible number.

If you get number (16): Would you like to receive \$49 in **six months** or \$50 in **seven months**
If you get number (17): Would you like to receive \$47 in **six months** or \$50 in **seven months**
If you get number (18): Would you like to receive \$44 in **six months** or \$50 in **seven months**
If you get number (19): Would you like to receive \$40 in **six months** or \$50 in **seven months**
If you get number (20): Would you like to receive \$35 in **six months** or \$50 in **seven months**
If you get number (21): Would you like to receive \$29 in **six months** or \$50 in **seven months**
If you get number (22): Would you like to receive \$22 in **six months** or \$50 in **seven months**

A.2 Appendix tables

Table A1: Time Preferences and Counseling Participation (Interval Regressions)

	(1)	(2)	(3)
Dependent Variable:	*Interval of* $IDF_{t,\tau}$		
Counseling (=1)	0.087***	0.077***	0.067***
	(0.017)	(0.017)	(0.017)
Has Present (=1)	-0.074***	-0.074***	-0.074***
	(0.009)	(0.009)	(0.009)
Six Month Delay (=1)	0.164***	0.162***	0.162***
	(0.007)	(0.007)	(0.007)
Age		-0.003	-0.008**
		(0.003)	(0.004)
Age^2		0.000	0.000
		(0.000)	(0.000)
African-American (=1)		-0.004	-0.005
		(0.019)	(0.018)
Female (=1)		0.093***	0.082***
		(0.018)	(0.018)
College Experience (=1)			0.042**
			(0.018)
ln(Adjusted Gross Income)			0.029***
			(0.009)
Number of Dependents			0.018
			(0.011)
Constant	0.652***	0.702***	0.506***
	(0.045)	(0.074)	(0.098)
Day-Specific Effects	Yes	Yes	Yes
Log-Likelihood	-6.5e+03	-6.4e+03	-6.4e+03
# of Observations	2334	2334	2334
# of Individuals	778	778	778

Notes: Interval regressions (Stewart, 1983). Dependent variable: Interval of $IDF_{t,\tau}$ measured from one of three price lists: $IDF_{0,1}$ $IDF_{0,6}$ $IDF_{6,1}$. Standard errors clustered on individual level in parentheses. Coefficients of dummies for day of study, imputed gender, imputed race, imputed education omitted from table.

Level of significance: $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A2: Different Discount Factors and Participation in Credit Counseling Program

	(1)	(2)	(3)
Dependent variable:	*Counseling Participation (=1)*		
$IDF_{t=0,\tau=1}$	1.17***		
	(0.36)		
$IDF_{t=0,\tau=6}$		3.32***	
		(1.03)	
$IDF_{t=6,\tau=1}$			1.42***
			(0.36)
Age	0.08**	0.08**	0.08**
	(0.04)	(0.04)	(0.04)
Age^2	-0.00**	-0.00**	-0.00**
	(0.00)	(0.00)	(0.00)
African-American (=1)	0.34*	0.30	0.32*
	(0.20)	(0.20)	(0.19)
Female (=1)	0.07	0.08	0.08
	(0.18)	(0.18)	(0.18)
College Experience (=1)	0.39**	0.39**	0.36**
	(0.18)	(0.18)	(0.18)
ln(Adjusted Gross Income)	0.07	0.07	0.06
	(0.08)	(0.08)	(0.08)
Number of Dependents	0.16	0.14	0.13
	(0.10)	(0.10)	(0.10)
Constant	-3.18***	-5.37***	-3.41***
	(0.98)	(1.34)	(1.00)
Day-Specific Effects	Yes	Yes	Yes
Log-Likelihood	-474.11	-474.41	-471.76
N	778	778	778

Notes: Logit regressions. Dependent variable: 1 if individual participated in credit counseling program, 0 otherwise. Robust standard errors in parentheses. Coefficients of dummies for day of study, imputed gender, imputed race, imputed education omitted from table.
Level of significance: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$