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## Financial Literacy and Credit Card Behaviors: A Cross-Sectional Analysis by Age

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# Financial Literacy and Credit Card Behaviors: A Cross-Sectional Analysis by Age

## Abstract

In this study, we use a measure of financial literacy that includes both a test score of actual financial literacy and a self-rating of perceived financial literacy to investigate how financial literacy affects five credit card behaviors: (1) always paying a credit card balance in full; (2) carrying over a credit card balance and being charged interest; (3) making only a minimum payment on a credit card balance; (4) being charged a fee for a late payment; and (5) being charged a fee for exceeding a credit limit. Probit analysis was used to assess each behavior with a large nationally representative sample of U.S. adults ( $N = 28,146$ ) divided into groups to reflect the five major decades in the adult life cycle (18–29; 30–39; 40–49; 50–59; and 60–69 and older). Perceived financial literacy was found to be a stronger predictor of less costly practices in credit card use than actual financial literacy for the five credit card behaviors and across each of the five age groups. The study also shows that the combination of the subjective assessment with the objective assessment of financial literacy provides a more comprehensive analysis of how financial literacy affects each credit card behavior. This combined approach to assessment produced the largest estimates of the effects of financial literacy on credit card behavior. The findings hold across the five credit card behaviors and the five age groups.

## Keywords

financial literacy, credit cards, financial behavior, consumers

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## Cover Page Footnote

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## Introduction

Over the past thirty years interest in financial literacy has grown significantly. One reason for this heightened interest is substantial changes in the workplace that have placed more responsibility on workers for financial decisions over such matters as retirement savings and investments. The growing complexity of the economy over the past few decades also has required households to make more integrated personal financial decisions regarding shorter-term financial objectives, such as managing household budgets, using credit cards for purchases, and paying annual Federal and state taxes, and regarding longer-term financial goals, such as saving for a child's college education and planning for retirement. Questions have arisen about whether the American public is sufficiently knowledgeable and prepared to handle the difficult and complex financial choices they face on a regular basis and over a lifetime. This interest in financial literacy has spawned extensive research on how financial literacy influences decision making and improves the financial capability of adults (e.g., Braunstein and Welch 2002; Hilgert et al. 2003; Lusardi and Mitchell 2007; Gale and Levine 2011; Hastings et al. 2012).

For this study we incorporated an alternative measure of financial literacy to what is typically used in studies of financial literacy. We added a subjective dimension that captures what individuals believe they know about financial matters to the usual objective multiple-choice and true-false test questions used for assessing financial literacy. We found in a previous study of financial behaviors (Allgood and Walstad 2012) that the combination of actual financial literacy, as measured by correct responses to cognitive test questions, and perceived financial literacy, as measured by respondents' self-assessment, provides more robust and nuanced insights about how financial literacy affects financial behavior. For example, individuals with a low level of actual financial literacy but a high level of perceived financial literacy were significantly less likely to adopt costly or potentially problematic financial behaviors. Our continuing thesis for this study is that this subjective assessment of financial literacy should be combined with an objective assessment of financial literacy because the composite measure provides more insights and shows a greater effect of financial literacy on financial behavior than does the use of objective assessments alone.

Another important dimension of this study is the cross-sectional analysis by age based on the recognition that financial decisions and behaviors are likely to change over the life cycle (Agarwal et al. 2009). The data contain survey responses from adults ages 18 to 65 (and older) on their demographic characteristics, financial literacy, and financial behaviors. Instead of analyzing the

full data set using all ages as we did in our prior study and as is done in many studies with national samples of adults, we split the full sample into five age-based samples that roughly approximate the five major adult decades of the life cycle: 18–29; 30–39; 40–49; 50–59; and 60–69 (and older). This cross-sectional analysis is an effective way to test how perceived financial literacy affects each age group and is valuable for investigating how actual and perceived financial literacy interact.

To demonstrate the value of this cross-sectional analysis by age, we focused on consumer behavior related to credit cards, which are frequently used by consumers and can be costly if consumers incur fees and regularly pay interest charges (Stango and Zinman 2009). The five behaviors that we studied related to credit card use were whether a consumer: (1) always pays a credit card bill in full; (2) carries over a credit card balance and is charged interest; (3) makes only a minimum payment on a credit card balance; (4) is assessed a late fee for a late credit card payment; and (5) is charged an over-the-limit fee for exceeding a credit card limit. The results from the analysis supply a decade-by-decade picture that offers subtle insights about what adults know about financial literacy, how they perceive financial literacy, and other factors that affect financial literacy at different ages.

## Background: Data and Literature

The survey data used for this study came from the 2009 National Financial Capability Study (NFCS), which was commissioned by the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation and conducted in consultation with the US Treasury Department and the US President’s Advisory Council on Financial Literacy. The goal of the study was to “assess and establish a baseline measure of the financial capability of US adults” through the administration of an online questionnaire about their financial behaviors and practices. The national sample is based on interviews that were conducted from June through October 2009 with 500 to 550 adults, 18 years of age and older, in each state and the District of Columbia. We combined state and DC data using NFCS-supplied weights that accounted for sampling unit differences based on age, gender, race and ethnicity, education levels, state, and region. This aggregation produced a representative national sample of 28,146 adults.<sup>1</sup>

The extensive NFCS questionnaire asked about many different financial topics, such as credit cards, checking and banking, saving and investing,

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<sup>1</sup> The FINRA Foundation website provides a copy of the questionnaire, a report on survey methods and basic survey findings, and an SPSS data file for the sample. The data were collected from May to July 2009. See: [www.finrafoundation.org/programs/capability/index.htm](http://www.finrafoundation.org/programs/capability/index.htm) and [www.usfinancialcapability.org](http://www.usfinancialcapability.org).

homeownership and mortgages, insurance and risk taking, retirement accounts and pensions, and auto and consumer loans. We limited our investigation to the effect of financial literacy on credit card behavior. We selected this topic because there is widespread consumer use of credit cards and their use provides key insights into financial behavior as consumers make frequent or regular purchases of goods and services (Gerdes 2008; Stango and Zinman 2009). Credit cards also are widely used across all age segments of the adult population, but likely for different purposes depending on age, thus making this financial topic a worthy one for a cross-sectional analysis by age grouping with the NFCS data. The other NFCS survey topics covered financial decisions that focused more on a product for specific conditions (types of insurance), involved large and discrete purchases (home mortgages or auto loans), or had unique financial characteristics often related to income (banking and investments). These topics were considered to be less suitable for our cross-sectional analysis by age because, unlike credit card use, which has fairly standard measures, the other financial products or services vary considerably and their use may be concentrated at particular ages (e.g., applying for and obtaining a mortgage for a home purchase).

A challenge of conducting research on financial literacy is how to define *financial literacy* because there is no standard definition in the literature (Remund 2010). This lack of consensus on the concept makes it difficult to construct measures of financial literacy that are broadly accepted and widely used. As a result, there have been significant differences in the methods used to assess financial literacy in research and evaluation studies. Most of the measurement of financial literacy to date has focused on the objective aspects of the concept and what people know or understand about financial matters because “to be financially literate, individuals must demonstrate literacy and skills needed to make choices within a financial marketplace” (Huston 2010, 309–10). This measurement is most often conducted using a set of multiple-choice and/or true-false test questions that are part of a larger survey instrument that asks about general or specific financial matters and behaviors (e.g., Hung et al. 2009).

The NFCS survey included five knowledge questions testing understanding of five financial concepts—compound interest, inflation effects on money, the relationship between bond prices and interest rates, interest payment differences on shorter- and longer-term mortgages, and stock diversification and risk. Three questions are multiple-choice and two are true-false, with the correct answers noted by an asterisk.

**Question 1:** Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years how much do you think you would have in the account if you left the money to grow: (a) more than \$102\*; (b) Exactly \$102; (c) less than \$102.

**Question 2:** Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in the account? (a) more than today; (b) exactly the same; (c) less than today\*.

**Question 3:** If interest rates rise, what will typically happen to bond prices? (a) they will rise; (b) they will fall\*; (c) they will remain the same; (d) there is no relationship between bond prices and the interest rate.

**Question 4:** A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. (a) true\*; (b) false.

**Question 5:** Buying a single company's stock usually provides a safer return than a stock mutual fund. (a) true; (b) false\*.

These questions have been placed in several national surveys, with results used as measures of financial literacy either via a question-by-question analysis or combined as an aggregate test score based on the percentage correct across items. Questions 1, 2, and 5 were used in the 2004 Health and Retirement Survey and in Wave 11 of the 2007–2008 National Longitudinal Survey of Youth (e.g., Lusardi and Mitchell 2008; Lusardi et al. 2010). Questions 1, 2, 4, and 5 have been used in the RAND American Life Panel (e.g., Lusardi and Mitchell 2009). A version of question 5 was used in a Survey of Consumers conducted by the University of Michigan in 2001 (Hilgert et al. 2003). Although the NFCS test questions focus on basic financial concepts in a simple format, they have been found to be challenging for adults and have served as valuable indicators of financial literacy in the above cited studies and several others (e.g., Lusardi 2011; Hastings et al. 2012).

A unique feature of the NFCS survey is the inclusion of two types of questions to assess respondents' level of financial literacy. In addition to the five objective test questions there is a subjective question asking respondents for a self-assessment of financial literacy: "On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial literacy?" Perceived financial literacy is recognized as an important dimension in a conceptual model of financial literacy (Hung et al. 2009), but empirical studies of this dimension are few and largely focus on cross-tabulations of self-ratings of financial (or economic) literacy with percentage correct scores on items testing financial literacy (Lusardi and Mitchell 2009; Lusardi and Tufano 2009; Lusardi 2010; Van Rooij et al. 2011). Further study of perceived financial literacy, in particular its interaction with objective assessments, would be beneficial because it can expand our understanding of how a more comprehensive measure affects financial behavior. It is likely to be the case that people's perceptions of their

overall financial literacy serve as influential and valid indicators of their financial behavior, even when controlling for their knowledge on specific financial topics.

## Variables: Age, Literacy, and Others

Table 1 reports the proportions, or means, for all the variables used in the study by age group and the sample size for each group.<sup>2</sup> The data on age were collected using ten age groups: 18–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, and 65 and older. To simplify the analysis, we combined two adjacent age groups so that the total number of categories was reduced to five: 18–29, 30–39, 40–49, 50–59, and 60–69 and older. These categories either exactly represent or approximate the five main decades of the adult life cycle, from the 20s through the 60s. The sample size of the categories ranged from a low of 3,457 for 18- to 29-year-olds to a high of 4,958 for adults 60 years of age and older.

Age was transformed into a continuous variable for the five categories by setting age at the midpoint of the two age ranges within a category (e.g., 18–24 and 25–29 for the 18–29 range) and calculating a weighted average. The oldest category (60–69 and up) was constructed by combining the 60- to 64-year-olds with those 65 years of age and older. Although the midpoint of the age range was used as the mean for the 60–64 group, the mean age for the 65 and older group was set at 70 for calculating the 60–69 and older mean age. The result of this transformation shows that the mean age is about at the middle of each age “decade” with the exception of the 20s, for which it is slightly lower at 23.27 years. The standard deviation is given in parenthesis below the mean for each age category. For the full sample the mean age was 45.24 years old.

**Table 1**  
**Variable Means by Age Group**

Variables	(1) 18–29	(2) 30–39	(3) 40–49	(4) 50–59	(5) 60–69+	(6) 18–69+
Age 18–24	0.622					0.135
Age 25–29	0.378					0.082
Age 30–34		0.506				0.087
Age 35–39		0.494				0.087
Age 40–44			0.514			0.096
Age 45–49			0.486			0.091
Age 50–54				0.528		0.105
Age 55–59				0.472		0.094
Age 60–64					0.313	0.069
Age 65+					0.687	0.152
Age	23.27 (2.91)	35.97 (3.00)	44.94 (2.00)	54.89 (2.00)	65.75 (1.85)	45.24 (15.41)

*(continued on next page)*

<sup>2</sup> Appendix A provides a detailed explanation of how each variable in Table 1 was obtained or constructed from the FINRA Financial Capability data set.

Q1 (interest)	0.739	0.784	0.781	0.791	0.794	0.777
Q2 (inflation)	0.456	0.589	0.682	0.739	0.760	0.645
Q3 (bonds)	0.214	0.264	0.294	0.308	0.304	0.276
Q4 (mortgage)	0.666	0.752	0.784	0.797	0.787	0.756
Q5 (stocks)	0.414	0.523	0.545	0.567	0.621	0.534
Actual literacy	2.489	2.912	3.086	3.201	3.267	2.989
	(1.41)	(1.44)	(1.43)	(1.40)	(1.40)	(1.44)
Perceived literacy	4.701	4.863	4.869	5.037	5.240	4.947
	(1.33)	(1.33)	(1.34)	(1.28)	(1.19)	(1.31)
Perceived-Hi	0.267	0.309	0.314	0.367	0.439	0.341
Perceived-Lo	0.733	0.691	0.686	0.633	0.561	0.659
Actual-Hi	0.270	0.394	0.450	0.483	0.514	0.422
Actual-Lo	0.730	0.606	0.550	0.517	0.486	0.578
Perc-Hi+ Actual-Hi	0.092	0.149	0.177	0.215	0.268	0.182
Perc-Hi+ Actual-Lo	0.175	0.160	0.136	0.153	0.171	0.160
Perc-Lo+ Actual-Hi	0.184	0.252	0.283	0.275	0.256	0.249
Perc-Lo+ Actual-Lo	0.549	0.439	0.404	0.358	0.305	0.410
Paidfull	0.441	0.338	0.356	0.368	0.542	0.418
Carrybalance	0.546	0.649	0.635	0.619	0.468	0.575
Minpayment	0.499	0.514	0.457	0.391	0.228	0.402
Latefee	0.324	0.353	0.293	0.256	0.146	0.264
Exceedcredit	0.223	0.217	0.167	0.144	0.074	0.157
Male	0.506	0.505	0.498	0.482	0.449	0.487
White	0.496	0.597	0.697	0.756	0.867	0.685
Nonwhite	0.504	0.403	0.303	0.244	0.133	0.315
<Highschool	0.052	0.036	0.031	0.023	0.031	0.035
=Highschool	0.327	0.248	0.284	0.289	0.307	0.293
Somecollege	0.435	0.392	0.420	0.429	0.417	0.419
College	0.144	0.213	0.173	0.161	0.116	0.159
Postgrad	0.043	0.111	0.092	0.098	0.128	0.094
Married	0.269	0.590	0.609	0.615	0.613	0.534
Single	0.701	0.300	0.199	0.140	0.0560	0.282
Divorced/sep	0.030	0.107	0.180	0.203	0.183	0.140
Widow/er	0.001	0.004	0.011	0.042	0.149	0.044
Children	0.601	1.402	1.173	0.538	0.147	0.735
	(1.00)	(1.30)	(1.22)	(0.91)	(0.50)	(1.10)
Selfemploy	0.047	0.085	0.106	0.109	0.064	0.081
Full-time	0.327	0.536	0.495	0.403	0.105	0.361
Part-time	0.147	0.082	0.080	0.087	0.086	0.098
Homemaker	0.093	0.133	0.105	0.082	0.045	0.090
Student	0.228	0.029	0.012	0.007	0.000	0.058
Disabled	0.010	0.029	0.066	0.085	0.025	0.042
Unemployed	0.146	0.100	0.113	0.109	0.026	0.098
Retired	0.000	0.006	0.024	0.119	0.648	0.172
LiveAlone	0.157	0.191	0.210	0.233	0.296	0.219
LivePartner	0.382	0.691	0.677	0.662	0.624	0.601
LiveParents	0.320	0.049	0.035	0.017	0.002	0.089
LiveOther	0.142	0.069	0.078	0.0886	0.077	0.092
<\$15K	0.319	0.105	0.110	0.0986	0.081	0.146
\$15-25K	0.156	0.111	0.100	0.119	0.163	0.132
\$25-25K	0.138	0.115	0.105	0.130	0.153	0.129
\$35-50K	0.133	0.163	0.166	0.162	0.183	0.161
\$50-75K	0.127	0.207	0.209	0.195	0.205	0.187
\$75-100K	0.064	0.140	0.130	0.115	0.098	0.107
\$100-150K	0.042	0.104	0.116	0.111	0.077	0.088
\$150K	0.020	0.054	0.064	0.069	0.040	0.049
Income	39.58	60.55	62.39	61.17	53.87	54.98
	(32.19)	(39.13)	(40.40)	(40.90)	(36.16)	(38.68)
Income-drop	0.422	0.431	0.441	0.435	0.316	0.406
Observations	3437	3640	3925	4283	4958	28146

*Note:* All variables are dummy variables (coded 0,1) except *Age*, *Children*, *Income*, *Actual literacy*, *Perceived literacy* (standard deviations in parenthesis).



## ***Financial Literacy***

Data are reported in Table 1 on both the average proportion of correct responses to each of the financial literacy questions (Q1 to Q5) and the average number of correct answers for all five test questions (Actual literacy). For the full sample the average percentage correct was 60 (three items correct), but it ranged from 50% for the youngest group to 65% for the oldest group.<sup>3</sup> The table shows that average perception of financial literacy (Perceived literacy) for the full sample was about 5 on the 7-point scale. That perception increases with age: it was lowest for the youngest group (4.7) and increased across all groups until it reached its maximum (5.2) with the oldest group.

We investigated the predictive power of differences in perceived financial literacy across individuals with approximately the same actual financial literacy. To this end, we categorized individuals as having high or low actual financial literacy and high or low perceived financial literacy. Respondents were classified as having high actual financial literacy (Actual-Hi) if their overall score on the five questions was above the overall mean (four or five); otherwise they were classified as low actual literacy (Actual-Lo). Slightly over 40% of respondents were in the high actual financial literacy group in the full sample. The inclusion in this category varied by age, with only 27% of young adults but 51% of the oldest adults included.

The self-assessment of overall financial literacy (1 being very low; 7 being very high) was transformed into two categorical variables. If respondents gave themselves an overall rating for their financial literacy that was above the mean (a 6 or a 7), they were placed in the high perceived financial literacy category (Perceived-Hi); otherwise, they were included in the low perceived financial literacy category (Perceived-Lo). About one-third (34%) of respondents were in the high perceived financial literacy group. This designation ranged across age groups with 27% for the youngest group but 44% for the oldest group being categorized as having high perceived financial literacy.

A third set of categorical variables was constructed by forming all possible financial literacy combinations with the percentage in each group for the full sample given in parentheses: (1) high perceived financial literacy and high actual financial literacy (Perc-Hi+Actual-Hi) (18%); (2) high perceived financial literacy and low actual financial literacy (Perc-Hi+Actual-Lo) (16%); (3) low perceived financial literacy and high actual financial literacy (Perc-Lo+Actual-Hi) (25%); and (4) low perceived financial literacy and low actual financial literacy (Perc-

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<sup>3</sup> When looked at by question for the full sample, the correct response rate ranged from a high of 78% for question 1 to a low of 28% correct for question 3. These two questions were the most and least difficult across all age groups.

Lo+Actual-Lo) (41%).<sup>4</sup> These combined variables show considerable differences across the age groups. Only 9% of the youngest group is in the high-high group, but the percentage rises to 27% for the oldest group. The pattern, of course, is reversed when looking at the groups from a low-low perspective, with the youngest group having the highest percentage at 55% and the oldest group having the lowest percentage at 31%. For the high perceived and low actual combination, the percentages remain comparable across the age groups (14% to 18%). For the low perceived and high actual combination, there is more variation across groups, 18% for 18- to 29-year-olds and 25%–28% for the other age groups. These combined variables for financial literacy will be the focus of the probit analysis to be discussed in a later section.

### ***Credit Card Behaviors***

The credit card variables were constructed as dummy variables,<sup>5</sup> taking the value of one for a yes response (percentage answering yes is indicated in parentheses) to survey questions that asked about five credit card practices:<sup>6</sup> “In the past 12 months, which of the following describes your experience with credit cards?” (1) I always paid my credit cards in full (PaidFull) (42%); (2) In some months, I carried over a balance and was charged interest (CarryBalance) (58%); (3) In some months, I paid the minimum payment only (MinPayment) (40%); (4) In some months, I was charged a late fee for late payment (LateFee) (26%); and (5)

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<sup>4</sup> The evidence indicates actual financial literacy and perceived financial literacy are measuring different characteristics. The correlation is only 0.24. It also is not the case that only respondents with high test scores have higher perceived financial literacy. We found that 3.5% of respondents had a rating of 6 or 7 for perceived financial literacy and an actual financial literacy score of 0 or 1.

<sup>5</sup> In empirical economics, binary (or indicator or categorical) variables are typically referred to as dummy variables. These variables take the value of zero or one to indicate the absence or presence of some categorical effect.

<sup>6</sup> A sixth survey item about credit card use asked for a yes or no answer to “In some months, I used the cards for a cash advance.” A decision was made to omit that item from the analysis for several reasons. First, cash advances differ from the other five credit card behaviors. It was the least frequently cited (only 13%) of the credit card behaviors. When respondents did report using it, it was often for an emergency or another unique purpose and generally not a fixed or recurring event as is making monthly credit card payments or being charged monthly fees or interest. Second, cash advances are used by a broad range of people, regardless of their level of financial literacy, when access to cash at a bank or ATM is not readily available and it is an emergency. The situations associated with getting a cash advance suggest that it is conceptually different from the other credit card behaviors, and therefore its relationship to financial literacy is likely to be uncertain and unpredictable. Third, our empirical analysis of the effects of financial literacy on cash advances confirmed our a priori expectations that getting a cash advance was different from the other credit card behaviors and its association with financial literacy would be weak and inconsequential.

In some months, I was charged an over-the-limit fee for exceeding my credit line (ExceedCredit) (16%). With the exception of the first item (always paying a bill in full), these credit card behaviors are not recommended because they can be costly in the form of extra fees or additional interest (Stango and Zinman 2009).

As is the case with the other variables in the data set, the responses to the credit card item changed based on the age segment. The general pattern appears to be that the youngest age group and the 60–69 and older age group report less costly credit card behaviors compared with adults in the 30–59 age range. For example, 44% of the youngest group always paid their credit card bills in full, but the same was true for just 34% of respondents ages 30–59. The percentage saying they always paid bills in full then rises again, to 54%, among the oldest group. Carrying a balance and being charged interest is reported by 55% of the 18- to 29-year-old respondents, by 65% of 30- to 39-year-olds, by about that same rate for those up to age 59, and then by 47% of the oldest group. The pattern most likely arises because younger adults and adults entering retirement are less liquidity constrained by the large expenses for family support and housing that affect 30- to 59-year-olds. The descriptive statistics reveal substantial differences across the age groups on financial literacy and credit card variables that get overlooked if only the full sample is used for analysis.

### ***Demographics***

Table 1 also includes demographic variables for gender (male) and race (white). The age-based samples are slightly more male (51%) for 18- to 29-year-olds and 30- to 39-year-olds, but become slightly more female in the next two decade samples (40s and 50s). The oldest group is predominantly female (55%). As for race, the age-based samples show substantial differences with 50% in the youngest category being white, but the percentages increase for each subsequent sample group, with the oldest sample being 87% white.

Education is measured by the highest level attained (less than high school, high school graduate only, some college, college graduate, postgraduate). Education differs across the age-based sample for each level: less than a high school graduate (2%–5%); high school graduate only (25%–33%); some college (39%–44%); college (12%–21%); and postgraduate (4%–13%). The youngest group, however, shows the greatest difference from the other groups because respondents in this group are more likely to have completed high school (33%) and have some college education (44%), but some have not yet had time to complete further education.

Marital status is captured with four categories (married, single, divorced or separated, widow or widower). As might be expected, the youngest group differs the most in marital status with only 27% being married, compared with 59%–61% for the other age samples. As for the number of financially dependent children,

the averages vary too by age, but not in the same way as the marriage or education variables. The 30- to 39-year-olds have the most children (1.4 on average) followed by the 40- to 49-year-olds (1.2) with the youngest group (0.60), the 50- to 59-year-olds (0.53), and the oldest group (0.15) having the fewest dependents.

Current status or employment is described in eight ways: self-employed; work full time for an employer; work part time for an employer; unemployed or temporarily laid off; sick, disabled, or unable to work; homemaker; full-time student; or retired. The most striking difference across age groups is full-time student status, which accounts for 23% of 18- to 29-year-olds, but 3% to 0% of all other age groups. Young adults (18-29) also are most likely to be employed part time (15%) or unemployed (15%). Full-time employment or self-employment is highest for 30- to 39-year-olds (62%) and 40- to 49-year-olds (60%), but falls for 50- to 59-year-olds (52%) since some in this group are starting to retire. As would be expected, most retirees are in the oldest group (65%).

Current living arrangements are covered by four classifications: only adult in household; live with spouse or significant other; live in parents' house; or live with other family, friends, or roommates. Living alone increases across the age groups, from 16% in the youngest group to 30% in the oldest group. Living with a spouse or significant other rises from 38% for 18- to 29-year-olds to a high of 69% for those ages 30–39. The youngest group also is most likely to state they are living with parents (32%) or that they are living with other family, friends, or a roommate (14%).

Annual household income is reported as discrete variables in eight categories: (1) less than \$15,000, (2) at least \$15,000 but less than \$25,000, (3) at least \$25,000 but less than \$35,000, (4) at least \$35,000 but less than \$50,000, (5) at least \$50,000 but less than \$75,000, (6) at least \$75,000 but less than \$100,000, (7) at least \$100,000 but less than \$150,000, and (8) greater than \$150,000. Income also was transformed into a continuous variable using procedures similar to those used for age.<sup>7</sup> The average income for the full sample was \$54,980, but it ranged from an average of \$39,580 for 18- to 29-year-olds to an average of \$62,390 for 40- to 49-year-olds. In addition, a dummy variable for a large income drop was created based on a yes response to the question “In the past 12 months, have you or your household experienced a large drop in income which you did not expect?” About 42%–44% of individuals age 18 to 59 gave a yes response, but only 32% of individuals age 60 and older said they had experienced an income drop, presumably because many are retired with fixed-income sources.

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<sup>7</sup> For respondents with income of more than \$15,000 and less than \$150,000, the mean was set to the midpoint of the range. For individuals with income of \$15,000 or less, the mean was set at \$15,000. For individuals with income of \$150,000 or more, the mean was set at \$150,000.

## Probit Analysis

A probit model was specified and estimated for each of the five credit card behaviors.<sup>8</sup> Separate estimation also was conducted for each credit card behavior across the five age groups. Each probit equation included as controls financial literacy and demographic variables. There are four financial literacy variables based on four groups: (1) Perc-Hi+Actual-Hi, (2) Perc-Hi+Actual-Lo, (3) Perc-Lo+Actual-Hi, and (4) Perc-Lo+Actual-Lo, with the last group serving as the omitted term. The set of demographic variables were gender (1 = male); race (1 = white); education level (less than high school, high school graduate only, some college, college graduate only, and postgraduate, with college graduate only as the omitted term); marital status (married, single, divorced or separated, widowed or widower, with married as the omitted term); number of dependent children; current status or employment (self-employed, full-time employed, part-time employed, disabled, unemployed, and retired, with full-time employed being omitted); living arrangement (alone; with parents; with spouse or partner; and with other family, friends, or roommates, using spouse or partner as the omitted term); annual income and income-squared; and whether an adult experienced a large drop in income (1 = yes).

The purpose of the probit analysis was to estimate the marginal effects of the explanatory variables on a dummy dependent variable for each age group. A marginal effect is a change in the likelihood of the dependent variable equaling one, computed for a discrete change in the dummy variable from zero to one when evaluating all other variables at their means. The marginal effect for continuous variables, such as number of dependent children or annual income, was obtained by taking the partial derivative of the likelihood function with respect to a given variable and evaluating it at the mean.

Of most interest from the probit analysis are the marginal effects of the financial literacy variables on credit card behaviors. The comparison between groups 1 and 4 (Perc-Hi+Actual-Hi versus Perc-Lo+Actual-Lo) lets both types of financial literacy change from high to low. It provides an estimate of the *total effect* of financial literacy, regardless of whether the source is perceived financial literacy or actual financial literacy. This comparison is likely to show the greatest contrast in the results because both types of financial literacy contribute to the difference.<sup>9</sup> The evaluation of the separate effect of actual financial literacy or

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<sup>8</sup> Probit analysis is a type of regression used to analyze binomial response variables, like the case here for credit card behavior.

<sup>9</sup> A comparison between groups 2 and 3 (Perc-Hi+Actual-Lo and Perc-Lo+Actual-Hi) also allows both financial literacy variables to change, but for the most part it is not a useful comparison because the changes are in the opposite direction.

perceived financial literacy is more difficult because there are two comparisons to be made for each component of financial literacy. The evaluation of the separate effect of perception can be based on a comparison of groups 1 and 3 (Perc-Hi+Actual-Hi versus Perc-Lo+Actual-Hi), which holds actual financial literacy at a high level, or groups 2 and 4 (Perc-Hi+Actual-Lo versus Perc-Lo+Actual-Lo), which holds actual financial literacy at a low level. For actual financial literacy, or financial knowledge, the comparison could be with groups 1 and 2 (Perc-Hi+Actual-Hi versus Perc-Hi+Actual-Lo), which holds perceived financial literacy at a high level, or with groups 3 and 4 (Perc-Lo+Actual-Hi versus Perc-Lo+Actual-Lo), which holds perceived financial literacy at a low level. To focus on the most essential results, only the marginal effects from the financial literacy variables are given in Table 2.<sup>10</sup> The complete probit results for all five credit card behaviors with all variables in each equation are reported in Appendix B.

### ***Paying Credit Card Bills***

The first section of Table 2 shows that perceived and actual financial literacy have significant effects on the probability that a person always pays a credit card bill in full each month regardless of the age category for the adult.<sup>11</sup> Beginning with the total effect comparison of groups 1 and 4, the respondents with high perceived and high actual financial literacy were significantly more likely than respondents with low perceived and low actual financial literacy to always pay their credit card balance in full each month. This total effect, however, varies by age group. It is highest for adults age 40 and older (16–18 percentage points more likely) and lowest for adults age 30–39 (9 percentage points more likely). In between these results are young adults in the high perceived and high actual group who are 14 percentage points more likely to always pay a credit card bill in full.

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<sup>10</sup> Robust  $z$ -statistics are reported in parentheses below each marginal effect in Table 2. They were computed using survey commands in Stata. The primary sampling units for the data set are the fifty states and the District of Columbia. Weights were included to match Census outcomes for age by gender, race and ethnicity, education, state, and region. The robust  $z$ -statistics are useful for evaluating whether there are statistically significant differences in the marginal effects between groups 1 and 4, 2 and 4, and 3 and 4. For the other group comparisons (1 and 2 or 1 and 3) a Wald test was conducted on the difference in the marginal effects, and the probabilities are reported in the lower portion of each panel section of Table 2.

<sup>11</sup> We also investigated the issue of reverse causality because financial literacy might arise from financial outcomes or behaviors, and not vice versa. We did not find reverse causality to be a problem. For further discussion of the issue and the robustness of the results with this full FINRA data set, see Allgood and Walstad (2012). In addition, several other studies of self-assessment of financial literacy and financial outcomes provide no support for reverse causality (e.g., Courchane et al. 2008; Van Rooij et al. 2011).

**Table 2**  
**Probit Results for Credit Card Behaviors by Age (for selected variables)**

	(1) 18–29	(2) 30–39	(3) 40–49	(4) 50–59	(5) 60–69+
<i>Always Pays Bill in Full</i>					
Perc-Hi+Actual-Hi (1)	0.1359 <sup>a</sup> (3.79)	0.0894 <sup>a</sup> (3.00)	0.1766 <sup>a</sup> (5.98)	0.1602 <sup>a</sup> (5.99)	0.1730 <sup>a</sup> (7.06)
Perc-Hi+Actual-Lo (2)	0.1455 <sup>a</sup> (4.59)	0.1588 <sup>a</sup> (4.93)	0.1566 <sup>a</sup> (4.57)	0.1225 <sup>a</sup> (3.95)	0.1099 <sup>a</sup> (3.94)
Perc-Lo+Actual-Hi (3)	0.0259 (0.90)	0.0042 (0.16)	0.0278 (1.08)	0.0724 <sup>a</sup> (2.86)	0.0594 <sup>b</sup> (2.38)
Wald Tests					
(1)–(3)	8.710 (0.00)	9.150 (0.00)	32.11 (0.00)	12.08 (0.00)	25.79 (0.00)
P1	0.0571	3.590	0.345	1.451	5.284
(1)–(2)	0.0571	3.590	0.345	1.451	5.284
P2	0.81	0.06	0.56	0.23	0.02
(2)–(3)	11.14	21.79	14.10	2.416	3.341
P3	0.00	0.00	0.00	0.12	0.07
<i>Carries a Balance</i>					
Perc-Hi+Actual-Hi (1)	-0.1035 <sup>a</sup> (2.85)	-0.0612 <sup>b</sup> (2.06)	-0.1344 <sup>a</sup> (4.67)	-0.1267 <sup>a</sup> (4.80)	-0.1598 <sup>a</sup> (6.51)
Perc-Hi+Actual-Lo (2)	-0.0803 <sup>b</sup> (2.57)	-0.1189 <sup>a</sup> (3.74)	-0.0999 <sup>a</sup> (3.00)	-0.0626 <sup>b</sup> (2.04)	-0.1050 <sup>a</sup> (3.77)
Perc-Lo+Actual-Hi (3)	0.0221 (0.77)	0.0185 (0.72)	-0.0053 (0.21)	-0.0119 (0.48)	-0.0569 <sup>b</sup> (2.27)
Wald Tests					
(1)–(3)	11.37 (0.00)	8.006 (0.01)	25.19 (0.00)	21.15 (0.00)	21.23 (0.00)
P1	0.319	2.555	0.966	4.038	4.045
(1)–(2)	0.319	2.555	0.966	4.038	4.045
P2	0.57	0.11	0.33	0.05	0.04
Observations	3425	3635	3933	4281	4943
<i>Makes Only Minimum Payment</i>					
Perc-Hi+Actual-Hi (1)	-0.1603 <sup>a</sup> (4.60)	-0.1259 <sup>a</sup> (3.92)	-0.1375 <sup>a</sup> (4.72)	-0.1536 <sup>a</sup> (5.99)	-0.1249 <sup>a</sup> (6.78)
Perc-Hi+Actual-Lo (2)	-0.0640 <sup>b</sup> (2.05)	-0.1374 <sup>a</sup> (4.11)	-0.0183 (0.54)	-0.0702 <sup>b</sup> (2.40)	-0.0856 <sup>a</sup> (4.26)
Perc-Lo+Actual-Hi (3)	-0.0758 <sup>a</sup> (2.62)	-0.0633 <sup>b</sup> (2.32)	-0.0587 <sup>b</sup> (2.25)	-0.0888 <sup>a</sup> (3.66)	-0.0705 <sup>a</sup> (3.81)
Wald Tests					
(1)–(3)	5.441 (0.02)	4.203 (0.04)	8.750 (0.00)	7.674 (0.01)	10.16 (0.00)
P1	6.003	0.0947	10.88	7.625	3.253
(1)–(2)	6.003	0.0947	10.88	7.625	3.253
P2	0.01	0.76	0.00	0.01	0.07
Observations	3435	3641	3947	4297	4955
<i>Is Charged a Late Fee</i>					
Perc-Hi+Actual-Hi (1)	-0.1378 <sup>a</sup> (4.43)	-0.1320 <sup>a</sup> (4.54)	-0.1117 <sup>a</sup> (4.39)	-0.112 <sup>a</sup> (5.29)	-0.0787 <sup>a</sup> (5.35)
Perc-Hi+Actual-Lo (2)	-0.0827 <sup>a</sup> (3.04)	-0.0603 <sup>a</sup> (2.00)	-0.0806 <sup>a</sup> (2.93)	-0.0590 <sup>b</sup> (2.42)	-0.0806 <sup>a</sup> (5.13)
Perc-Lo+Actual-Hi (3)	-0.0484 (1.80)	-0.0287 (1.14)	0.0002 (0.01)	-0.0309 (1.50)	-0.0372 <sup>b</sup> (2.51)
Wald Tests					
(1)–(3)	7.810 (0.01)	13.76 (0.00)	21.95 (0.00)	17.42 (0.00)	9.779 (0.00)
P1	2.833	4.546	0.992	4.479	0.255
(1)–(2)	2.833	4.546	0.992	4.479	0.255
P2	0.09	0.03	0.32	0.03	0.61
Observations	3435	3641	3947	4297	4955
<i>Exceeds Credit Limit</i>					
Perc-Hi+Actual-Hi (1)	-0.0766 <sup>a</sup> (2.89)	-0.0938 <sup>a</sup> (4.02)	-0.0594 <sup>a</sup> (3.09)	-0.0424 <sup>b</sup> (2.45)	-0.0409 <sup>a</sup> (4.22)
Perc-Hi+Actual-Lo (2)	-0.0352 (1.53)	-0.0488 <sup>b</sup> (2.01)	-0.0418 <sup>b</sup> (2.01)	-0.0121 (0.64)	-0.0248 <sup>b</sup> (2.28)
Perc-Lo+Actual-Hi (1)	-0.0418 (1.77)	-0.0498 <sup>b</sup> (2.50)	-0.0003 (0.02)	-0.0196 (1.25)	-0.0206 <sup>b</sup> (2.08)
Wald Tests					
(1)–(3)	1.692 (0.19)	4.240 (0.04)	10.150 (0.00)	2.005 (0.16)	5.285 (0.02)
P1	2.166	2.877	0.536	2.181	1.936
(1)–(2)	2.166	2.877	0.536	2.181	1.936
P2	0.14	0.09	0.46	0.14	0.16
Observations	3431	3635	3926	4293	4953

Note: Selected results from probit regressions for four credit card behaviors. Other variables used but not reported are in Appendix B. The coefficients are the marginal effects with the absolute value of robust  $z$ -statistics in parentheses. Significance: a =  $\leq .01$ ; b =  $p \leq 0.05$ . The Wald statistics tests whether the marginal effects are different other with  $p$ -values in parentheses.

The comparison of groups 2 and 4 for all the age groups shows that individuals with high perceived financial literacy but low actual financial literacy are significantly more likely to always pay their credit card bills in full compared with the group of respondents with low perceived and low actual financial literacy. There are differences by age. The strongest results are found with 30- to 39-year-olds, who are 16 percentage points more likely to always pay their credit card bills in full, although similar results are found with the 18- to 29-year-olds and 40- to 49-year-olds. The effects are somewhat lower for those 50 years of age and older, who are 11–12 percentage points more likely to always pay a credit card bill in full. What these outcomes suggest is that the perception of one's own financial literacy clearly matters to credit card management, perhaps because the measure of actual financial literacy does not fully capture what people know or because personal awareness of what is known provides a broader perspective for guiding behavior.

Further evidence on the importance of perceived financial literacy, but in this case probably working as reinforcement for a high level of actual financial literacy, is found by comparing the change from a high to a low level of perceived literacy, holding actual financial literacy high. This comparison would be the difference in the coefficients between groups 1 and 3, but because the coefficients for group 3 are relatively small for most age groups, the perception effect is still large. The Wald test of whether the marginal coefficients are equal for the two groups show statistically significant differences in the marginal effects for PaidFull for all five age groups. The coefficient difference ranges from 9 to 11 percentage points more likely for all age groups in the high perceived and high actual category, except for 40- to 49-year-olds, for which the difference is 15 percentage points. Apparently, credit card management for adults who show a high level of actual financial literacy gets an extra benefit when these adults also perceive that their financial literacy is high.

With the analysis of changes in perception now complete, the spotlight can turn to the effects of changes in actual financial literacy when holding perceived literacy constant. One of the two contrasts is shown by the differences in marginal effects between groups 1 and 2 with perceived literacy held constant at a high level. The Wald test for whether the marginal coefficients for groups 1 and 2 are equal show no statistically significant differences for four of the five age groups. The exception is for those aged 60 and older, who are 6 percentage points more likely to always pay a credit card bill in full when actual financial literacy moves from low to high. Perceived literacy can also be held constant at a low level. This group contrast is shown by the marginal effects for group 3 with group 4. These marginal effects are positive and in the expected direction for all age groups, but they are statistically significant only at the upper end of the age distribution. Adults 50 years of age and older are 6–7 percentage points more likely to always



pay a credit card bill in full as actual financial literacy increases from low to high and perceived financial literacy is held at a low level. This result supports the group 1 and 2 comparison that the change in actual financial literacy has its greatest influence among older adults when perceived literacy is held constant at a high level.

### ***Other Credit Card Behaviors***

The results for the four other credit card behaviors, shown in the four other parts of Table 2, are consistent with the financial literacy findings from the probit analysis of paying a credit card bill in full, albeit from the opposite perspective of potentially more costly use of credit cards. In most cases, and as is generally expected, the largest effect is found in the contrast between groups 1 and 4 because both types of financial literacy move from high to low. In addition, estimates for perceived financial literacy show it to be important. The comparison of groups 2 and 4, which keeps actual financial literacy at a low level and lets perceived literacy change from high to low, indicates that perceived financial literacy is a significant factor affecting the four other credit card behaviors. This result is reinforced in the comparison of groups 1 and 3 because the coefficient difference is statistically significant in the expected direction in eighteen of the twenty Wald tests in Table 2 for those four other credit card behaviors. As for actual financial literacy, its effects are substantially less pronounced, as is the case for PaidFull results when perceived financial literacy is held constant at a high or low level. In the comparison of groups 1 and 2, the coefficient difference for actual financial literacy is statistically significant in only seven of the twenty Wald tests, and in the comparison of groups 3 and 4, the difference is statistically significant in only nine of twenty tests, with five of the significant results coming from the five age groups in the minimum payment analysis.

There is an age-related anomaly in Table 2 that is worth noting. The 30- to 39-year-olds in the high perceived and high actual group exhibit more costly behaviors related to always paying a credit card bill on time (7 percentage points less likely) or carrying a credit card balance (6 percentage points more likely) than the 30- to 39-year-olds in the high perceived and low actual group. By contrast, in almost all of the other age segments for those two credit card behaviors, the results for the high perceived and high actual group indicate that they participate in less costly behavior. With two other credit card behaviors, the shift is to the less costly side. The high perceived and high actual group is significantly less likely (by 5–7 percentage points) to report being charged a late fee or exceeding a credit limit compared with the high perceived and low actual group.

A reasonable explanation for this anomaly may be that 30- to 39-year-old adults have more financial concerns because they are in a higher consumption

period of their lives than the other age groups. They are more likely to be establishing careers, getting married or divorced, having children, and buying houses. Their incomes may not match their consumption demands at this stage of life, so they use the credit card as a monthly buffer for managing income and expenses. They are thus less likely to always pay a credit card bill in full each month and are more likely to carry a credit card balance and be charged interest than the other age segments (see Table 1), so this is not atypical behavior. What would be more unusual for this age segment, however, would be to pay credit card fees, such as a late fee or an over-the-limit fee, because those fees are direct penalties for not being responsible in credit card use. In these cases, high levels of perceived and actual financial literacy appear to make a difference in reducing such costly behaviors.

### ***Demographic Effects***

Although the financial literacy variables show the greatest and most consistent influence on credit card behaviors, there are other variables that affect credit card behaviors and that differ by age group. The explanation that follows will highlight the significant variables that appear to be associated with credit card outcome by age group. This discussion, however, will be more cursory. The detailed results for all the demographic variables can be found in Appendix B.

Gender seems to make a difference in paying a credit card bill in full. Among those age 18–24, males are 10 percentage points more likely to pay a credit card bill in full, but the percentage drops with each subsequent age group until it is only half as large (5 percentage points) among 50- to 59-year-olds. Then, surprisingly, males who are 60 years of age and older are 5 percentage points less likely to pay a credit card bill in full. This pattern of males not in the oldest groups using less costly credit card practices is also seen in the results for carrying a balance (for ages 18–49) and for being charged a late fee for a credit card payment (for ages 18–59). Males 60 years of age and older, however, are significantly more likely (by 3 percentage points) to report that they have exceeded a credit limit and been charged interest.

There are some differences in the way whites and nonwhites handle credit cards, but the most consistent and largest ones across all the credit card outcomes are found among the oldest adults. Whites 60 years of age and older are 13 percentage points more likely to pay a credit card bill in full, 9 percentage points less likely to carry a credit card balance, 16 percentage points less likely to make only a minimum payment on a credit card, 19 percentage points less likely to be charged a late fee for a credit card payment, and 12 percentage points less likely to exceed a credit limit.

Education level affects credit card outcomes in fairly predictable ways across the age groups. The general dividing line is whether a person is a college

graduate. Individuals age 18–39 with only some college education are less likely to pay a credit card bill in full and more likely to carry a balance, make only a minimum payment, be charged a late fee, and exceed a credit limit. Being only a high school graduate or not graduating from high school also greatly increases the likelihood of adopting costly behaviors related to credit card use, but that pattern is less consistent and less prevalent across the age groups.

One of the most interesting demographic findings related to credit card behavior concerns having financially dependent children. Raising children is costly, and as a result can have negative effects on credit card behavior even after controlling for all other demographic and financial literacy variables. Adults with a dependent child for four of the five age groups (adults age 30 and older) were significantly less likely to pay a credit card bill in full and significantly more likely to report costly behaviors for the other four outcomes.

When we look at results for respondents outside of the typical labor force, we find three interesting findings. Perhaps the most surprising is that students in the 18- to 29-year-old bracket are 19 percentage points more likely than full-time employees to pay a credit card bill in full, 20 percentage points less likely to carry over a credit card balance, 11 percentage points less likely to make only a minimum payment on a credit card, 8 percentage points less likely to be charged a late fee on a credit card, and 9 percentage points less likely to exceed a credit card limit. These results run counter to the public impression that students in postsecondary education have more difficulty managing the cost of credit card use, but they are consistent in research on this group, suggesting that the majority of college students are relatively careful in their use of credit cards (e.g., Lyons 2004). The second finding across most of the age groups is that homemakers effectively manage their credit card use so that they are more likely to pay their bills on time and less likely to carry over a credit card balance, make only a minimum payment, and be charged a late fee than full-time employee. Finally, retirees in either the 50–59 or 60 and older age segments are consistently less likely to engage in costly behavior associated with credit card use than full-time employees.

The other key demographic influence comes from an unexpected change in income. Over a third of respondents (41%) reported a large drop in their income. The high percentage is likely because the interviewing was conducted from May to July 2009, during the last recession. This loss of income appeared to increase costly credit card behavior as people used credit cards to manage the income change. For all age groups, the respondents who replied that they had experienced a large income drop reported being less likely to always pay a credit card bill in full and being more likely to be charged interest, make only a minimum payment, and be assessed a late fee or an over-the-limit fee.

## Conclusion

We began this study with the expectation that a person's self-assessed level of financial literacy would be as important for predicting personal financial behavior as is their actual financial literacy. We were unsure, however, if this hypothesis would hold when the full sample was divided into five age categories (18–29; 30–39; 40–49; 50–59; and 60–69 and older) that approximate the five key decades of the adult life cycle. We find ample evidence supporting this expectation for the five credit card behaviors we studied across the five age groups.

Perceived financial literacy was found to be a stronger predictor of less costly practices in credit card use than actual financial literacy for each of the five credit card behaviors and in each age group. For example, an 18- to 29-year-old with high perceived financial literacy and low actual financial literacy compared with another young adult with low perceived and low actual financial literacy was 15 percentage points more likely to always pay a credit card bill in full, 8 percentage points less likely to carry a credit card balance and be charged interest, 6 percentage points less likely to make only a minimum payment on a credit card, 8 percentage points less likely to be charged a late fee on a credit card, and 4 percentage points less likely to be charged an over-the-limit fee on a credit card.

We found the same basic pattern of results for adults 60 years of age and older when comparing those individuals with high perceived financial literacy and low actual financial literacy to those individuals with low perceived and low actual financial literacy. They were 11 percentage points more likely to always pay a credit card balance in full, 11 percentage points less likely to carry a credit card balance and be charged interest, 9 percentage points less likely to make only a minimum payment on a credit card, 8 percentage points less likely to be charged a late fee on a credit card, and 2 percentage points less likely to be charged an over-the-limit fee on a credit card. By contrast, when the focus is on actual financial literacy controlling for perceived financial literacy, the findings from our empirical analysis are less significant and more muted in different age segments. Among 18- to 29-year-olds, holding perceived financial literacy at a low level and letting actual financial literacy change from low to high produced insignificant effects on four of the five credit card behaviors. Although in a similar comparison, but with adults age 60 and older, the results were significant for the five credit card outcomes, though the effects of actual financial literacy on credit card behaviors were relatively minor (2–7 percentage points).

What is important to understand from this research is that people rate themselves differently in terms of their financial literacy and that these overall ratings are predictive of financial behaviors. Perception matters when it comes to assessing the effects of financial literacy on credit card use because it is broad-ranging and lets people evaluate what they think they know based on their life

experiences and circumstances. This statement, however, should not be interpreted as saying that perception is the only measure that should be used to assess financial literacy because it depends on accurate self-assessment. It also should not be concluded that measures of actual financial literacy are flawed and not worth using, because they can and do provide reliable and valid indicators of what a person knows about some particular topics. These objective measures, however, also have their limitations when the assessment is done with a just a few test items to serve as a proxy for the full range of financial literacy. The limitation of both approaches can be overcome to a certain extent by using a composite measure that includes both objective and subjective dimensions of financial literacy because it provides a more comprehensive assessment. We found that in almost all cases, the largest and most beneficial effect of financial literacy on credit card behaviors came from among the group of adults with both a high level of actual financial literacy and a high level of perceived financial literacy. The result was robust, being found for all five credit card behaviors and across almost all of the five age groups analyzed in this study.

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## Appendix A: Variable Definitions

### A. Demographic variables

1. **Male** = male respondent. [A3]
2. **Age**: (a) age by groups: 18–24, 25–29; 30–34, 35–39; 40–44, 45–49; 50–54, 55–59; 60–64, 65+ [A3aw]; (b) Combined adjacent age groups to reduce to five: 18–29; 30–39; 40–49; 50–59; 60–69+; (c) **Age** = respondent's age in years. Continuous. [used A3aw and mid-point range; for 65+ set age equal to 70]
3. **White** = white or Caucasian. [A4]
4. **Education**: (a) **< Highschool** = did not complete high school; (b) = **Highschool** = high school graduate; (c) **Somecollege** = some college; (d) **College** = college graduate; (e) **Postgrad** = graduate education. [A5]
5. **Marital status**: (a) **Married** = married; (b) **Single** = single; (c) **Divorced/sep** = divorced or separated; (d) **Widow/er** = widow or widower. [A6]
6. **Children**: number of children who are financial dependents. Continuous. [A11]
7. **Employment or work status**: (a) **Selfemployed** = self-employed; (b) **Full-time** = work full-time for an employer; (c) **Part-time** = work part-time for an employer; (d) **Homemaker** = homemaker; (e) **Student** = full-time student; (f) **Disabled** = permanently sick, disabled, or unable to work; (g) **Unemployed** = unemployed or temporarily laid off; (h) **Retired** = retired. [A10]
8. **Living arrangements**: (a) **LiveAlone** = only adult in household; (b) **LivePartner** = live with my spouse/partner/significant other; (c) **LiveParents** = live in my parents' home; (d) **LiveOther** = live with other family, friends, or roommates. [A7]
9. **Income**: (a) Income by group: \$15K, \$15–25K, \$25–35K, \$35–50K, \$50–75K, \$75–100K, \$100–150K, \$150K+ [A8]; (b) **Income** = respondent's income. Continuous. [calculated from A8 using mid-point of range except used lowest (\$15K) and highest (\$150K) for those categories]
10. **Income-drop** = Yes to: *Has your household experienced a large drop in income you did not expect?* [J10]

### B. Financial Literacy Variables

11. **Q1 to Q5**. See text for wording of test items and correct answers. [M6 to M10]
12. **Actual Literacy** = sum of correct responses to five financial literacy test items. Continuous. [M6–M10]
13. **Perceived Literacy** = self-rating response to: *On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial knowledge.* Continuous. [M4]
14. **Perceived literacy split**: (a) **Perceived-Hi** = self-rating > mean; (b) **Perceived-Lo** = self-rating ≤ mean.
15. **Actual literacy split**: (a) **Actual-Hi** = test score > mean; (b) **Actual-Lo** = test score ≤ mean.
16. **Financial literacy groups**: (a) **Perc-Hi+Actual-Hi** = self-rating > mean and test score > mean; (b) **Perc-Hi+Actual-Lo** = self-rating > mean and test score ≤ mean; (c) **Perc-Lo+Actual-Hi** = self-rating ≤ mean and test score > mean; (d) **Perc-Lo+Actual-Lo** = self-rating ≤ mean and test score ≤ mean.

### C. Credit Card (CC) Behaviors

17. **Paidfull** = *I always paid my credit cards in full.* Yes. [F2\_1]
18. **Carrybalance** = *In some months, I carried over a balance and was charged interest.* Yes. [F2\_2]
19. **Minpayment** = *In some months, I paid the minimum payment only.* Yes. [F2\_3]
20. **Latefee** = *In some months, I was charged a late fee for a late payment.* Yes. [F2\_4]
21. **Exceedcredit** = *In some months, I was charged an over the limit fee for exceeding my credit line.* Yes. [F2\_5]

*Note:* Variables are based on the National Financial Capability Study (NFCS) data set. The bracket item at the end of a variable or set of variables is the NFCS item survey code. All variables constructed from this data set for this study are (0,1) dummy variables except five (*Age, Children, Income, Actual literacy, and Perceived literacy*).

## Appendix B: Probit Results (all variables)

(continued on next page)

**Table B1**  
**Always Paid Credit Card Bill in Full by Age**

Variables	(1) 18–29	(2) 30–39	(3) 40–49	(4) 50–59	(5) 60–69+
Perc-Hi+Actual-Hi (1)	0.1359 <sup>a</sup> (3.79)	0.0894 <sup>a</sup> (3.00)	0.1766 <sup>a</sup> (5.98)	0.1602 <sup>a</sup> (5.99)	0.1730 <sup>a</sup> (7.06)
Perc-Hi+Actual-Lo (2)	0.1455 <sup>a</sup> (4.59)	0.1588 <sup>a</sup> (4.93)	0.1566 <sup>a</sup> (4.57)	0.1225 <sup>a</sup> (3.95)	0.1099 <sup>a</sup> (3.94)
Perc-Lo+Actual-Hi (3)	0.0259 (0.90)	0.0042 (0.16)	0.0278 (1.08)	0.0724 <sup>a</sup> (2.86)	0.0594 <sup>b</sup> (2.38)
Male	0.1002 <sup>a</sup> (4.29)	0.0876 <sup>a</sup> (4.07)	0.0672 <sup>a</sup> (3.21)	0.0494 <sup>a</sup> (2.50)	-0.0517 <sup>a</sup> (2.70)
White	-0.0081 (0.36)	-0.0529 <sup>b</sup> (2.51)	0.0237 (-1.00)	0.0676 <sup>a</sup> (-2.62)	0.1285 <sup>a</sup> (-3.93)
<Highschool	-0.0123 (0.14)	-0.0423 (0.50)	-0.0734 (0.73)	-0.2798 <sup>a</sup> (3.33)	-0.0456 (0.66)
=Highschool	-0.0761 <sup>b</sup> (2.32)	-0.1354 <sup>a</sup> (4.50)	-0.0888 <sup>a</sup> (3.07)	-0.0526 (1.93)	-0.0334 (1.20)
Somecollege	-0.1632 <sup>a</sup> (5.91)	-0.1308 <sup>a</sup> (5.38)	-0.0342 (1.45)	-0.0795 <sup>a</sup> (3.44)	-0.0671 <sup>a</sup> (2.72)
Postgrad	0.0258 (0.66)	0.1072 <sup>a</sup> (3.86)	0.0702 <sup>b</sup> (2.43)	0.0449 (1.65)	0.0380 (1.40)
Single	-0.0466 (1.33)	-0.0734 <sup>b</sup> (2.13)	-0.0502 (1.35)	-0.0619 (1.37)	-0.0379 (-0.60)
Divorced/sep	-0.0734 (0.95)	-0.1345 <sup>a</sup> (3.06)	-0.0761 <sup>b</sup> (2.02)	-0.0904 <sup>b</sup> (2.12)	0.0758 (1.41)
Widow/er		0.0476 (0.27)	0.1606 (1.53)	0.0218 (0.34)	-0.0204 (0.36)
Children	-0.0107 (0.79)	-0.0411 <sup>a</sup> (4.52)	-0.0276 <sup>a</sup> (3.08)	-0.0388 <sup>a</sup> (3.47)	-0.0568 <sup>a</sup> (2.98)
Selfemployed	0.1339 <sup>b</sup> (2.47)	0.0511 (1.38)	0.0835 <sup>a</sup> (2.67)	0.0963 <sup>a</sup> (3.14)	-0.0225 (0.54)
Part-time	0.0209 (0.59)	0.0406 (0.98)	0.0853 <sup>b</sup> (2.18)	0.0866 <sup>b</sup> (2.47)	0.1267 <sup>a</sup> (3.19)
Homemaker	0.0480 (1.08)	0.0692 <sup>b</sup> (1.96)	0.1619 <sup>a</sup> (4.16)	0.1729 <sup>a</sup> (4.33)	0.1888 <sup>a</sup> (3.81)
Student	0.1850 <sup>a</sup> (5.35)	0.1200 (1.56)	-0.0229 (0.21)	-0.0967 (0.96)	
Disabled	0.0393 (0.28)	0.0475 (0.51)	-0.0935 (1.85)	-0.0073 (0.16)	-0.0404 (0.55)
Unemployed	0.0464 (1.01)	0.0221 (0.47)	0.0595 (1.44)	0.0643 (1.82)	0.0654 (1.04)
Retired		-0.1703 (1.21)	0.1722 <sup>b</sup> (2.46)	0.1431 <sup>a</sup> (4.46)	0.1801 <sup>a</sup> (6.16)
LiveAlone	0.1733 <sup>a</sup> (4.43)	0.0746 (1.83)	0.1007 <sup>b</sup> (2.49)	0.1503 <sup>a</sup> (3.29)	0.0445 (0.81)
LiveWithParents	0.1443 <sup>a</sup> (3.81)	0.1502 <sup>b</sup> (2.27)	0.1715 <sup>b</sup> (2.29)	0.2518 <sup>b</sup> (2.56)	-0.2905 (1.70)
LiveOther	0.0922 <sup>b</sup> (2.25)	0.0466 (0.83)	0.0008 (0.02)	0.0422 (0.80)	-0.1105 (1.84)
Income	-0.0025 (1.92)	-0.0027 <sup>b</sup> (2.17)	-0.0015 (1.21)	0.0015 (1.33)	0.0029 <sup>b</sup> (2.73)
Income-sq	0.0000 <sup>a</sup> (3.11)	0.0000 <sup>a</sup> (3.27)	0.0000 <sup>a</sup> (2.87)	0.0000 (0.18)	-0.0000 (0.63)
Income-drop	-0.0966 <sup>a</sup> (4.06)	-0.0670 <sup>a</sup> (3.01)	-0.0788 <sup>a</sup> (3.73)	-0.0530 <sup>a</sup> (2.66)	-0.0909 <sup>a</sup> (4.71)
Observations	3417	3634	3934	4283	4932
Log Likelihood	-2142	-2094	-2328	-2615	-3144
Chi-Squared	264.4	314.6	306.9	281.5	366.4
Pseudo R-squared	0.0845	0.100	0.0897	0.0733	0.0758
Wald Tests					
(1)–(3)	8.710 (0.00)	9.150 (0.00)	32.11 (0.00)	12.08 (0.00)	25.79 (0.00)
P1					
(1)–(2)	0.0571 (0.81)	3.590 (0.06)	0.345 (0.56)	1.451 (0.23)	5.284 (0.02)
P2					
(2)–(3)	11.14 (0.00)	21.79 (0.00)	14.10 (0.00)	2.416 (0.12)	3.341 (0.07)
P3					

*Note:* The coefficients are the marginal effects of probit regressions with the absolute value of robust z-statistics in parentheses. Significance: a =  $\leq .01$ ; b =  $p \leq 0.05$ . The Wald statistics test that the marginal effects are different from each other with p-values in parentheses.



**Table B2**  
**Carry Over a Credit Card Balance and Charged Interest by Age**

Variables	(1) 18–29	(2) 30–39	(3) 40–49	(4) 50–59	(5) 60–69+
Perc-Hi+Actual-Hi (1)	-0.1035 <sup>a</sup> (2.85)	-0.0612 <sup>b</sup> (2.06)	-0.1344 <sup>a</sup> (4.67)	-0.1267 <sup>a</sup> (4.80)	-0.1598 <sup>a</sup> (6.51)
Perc-Hi+Actual-Lo (2)	-0.0803 <sup>b</sup> (2.57)	-0.1189 <sup>a</sup> (3.74)	-0.0999 <sup>a</sup> (3.00)	-0.0626 <sup>b</sup> (2.04)	-0.1050 <sup>a</sup> (3.77)
Perc-Lo+Actual-Hi (3)	0.0221 (0.77)	0.0185 (0.72)	-0.0053 (0.21)	-0.0119 (0.48)	-0.0569 <sup>b</sup> (2.27)
Male	-0.0749 <sup>a</sup> (3.16)	-0.0535 <sup>b</sup> (2.45)	-0.0704 <sup>a</sup> (3.36)	-0.0225 (1.13)	0.0315 (1.66)
White	-0.0030 (0.13)	0.0870 <sup>a</sup> (4.05)	0.0040 (0.17)	-0.0243 (0.95)	-0.0933 <sup>a</sup> (2.93)
<Highschool	-0.0754 (0.87)	0.0389 (0.46)	-0.0177 (0.18)	0.1634 <sup>a</sup> (2.05)	0.0200 (0.28)
=Highschool	0.0268 (0.82)	0.0716 <sup>a</sup> (2.35)	0.0399 (1.37)	0.0668 <sup>a</sup> (2.46)	0.0248 (0.90)
Somecollege	0.1379 <sup>a</sup> (4.98)	0.1068 <sup>a</sup> (4.26)	0.0338 (1.43)	0.0756 <sup>a</sup> (3.26)	0.0535 <sup>b</sup> (2.19)
Postgrad	0.0304 (0.81)	-0.0851 <sup>a</sup> (3.04)	-0.0948 <sup>a</sup> (3.28)	-0.0323 (1.19)	-0.0469 (1.75)
Single	0.0376 (1.09)	0.0435 (1.26)	0.0551 (1.34)	0.0369 (0.79)	0.0200 (0.32)
Divorced/sep	0.1351 (1.80)	0.0623 (1.39)	0.0367 (0.94)	0.0828 (1.88)	0.0699 (1.32)
Widow/er		-0.0480 (0.27)	-0.1441 (1.36)	-0.0290 (0.46)	0.0160 (0.28)
Children	0.0065 (0.48)	0.0251 <sup>a</sup> (2.76)	0.0209 <sup>b</sup> (2.25)	0.0354 <sup>a</sup> (3.23)	0.0504 <sup>a</sup> (2.86)
Selfemployed	-0.0332 (0.60)	-0.0164 (0.45)	-0.0149 (0.48)	-0.0583 (1.94)	0.0175 (0.42)
Part-time	-0.0556 (1.56)	-0.0233 (0.57)	-0.0499 (1.31)	-0.0607 (1.72)	-0.0631 (1.59)
Homemaker	-0.1178 <sup>a</sup> (2.64)	-0.0593 (1.69)	-0.1388 <sup>a</sup> (3.58)	-0.1728 <sup>a</sup> (4.34)	-0.1439 <sup>a</sup> (2.86)
Student	-0.2014 <sup>a</sup> (5.85)	-0.0135 (0.18)	-0.1397 (1.36)	0.0008 (0.01)	
Disabled	-0.1443 (1.12)	-0.0865 (1.02)	-0.0294 (0.56)	0.0088 (0.20)	-0.0059 (0.08)
Unemployed	-0.0972 <sup>b</sup> (2.14)	0.0140 (0.30)	-0.0776 (1.93)	-0.0286 (0.81)	-0.0583 (0.91)
Retired		-0.2074 (1.18)	-0.1054 (1.54)	-0.1154 <sup>a</sup> (3.63)	-0.1773 <sup>a</sup> (6.10)
LiveAlone	-0.1196 <sup>a</sup> (3.02)	-0.0240 (0.60)	-0.0426 (1.04)	-0.1044 <sup>b</sup> (2.26)	-0.0135 (0.25)
LiveWithParents	-0.1577 <sup>a</sup> (4.21)	-0.1433 <sup>b</sup> (2.24)	-0.1769 <sup>b</sup> (2.46)	-0.1516 (1.56)	-0.1716 (0.93)
LiveWithOther	-0.0971 <sup>b</sup> (2.40)	0.0392 (0.71)	0.0030 (0.06)	0.0316 (0.60)	0.1370 <sup>b</sup> (2.31)
Income	0.0017 (1.32)	0.0034 <sup>a</sup> (2.69)	0.0028 <sup>b</sup> (2.40)	-0.0005 (0.43)	-0.0016 (1.55)
Income-sq	-0.0000 <sup>a</sup> (2.33)	-0.0000 <sup>b</sup> (3.55)	-0.0000 <sup>b</sup> (3.65)	-0.0000 (0.64)	-0.0000 (0.16)
Income-drop	0.1316 <sup>a</sup> (5.60)	0.0920 <sup>a</sup> (4.14)	0.0687 <sup>a</sup> (3.27)	0.0410 <sup>b</sup> (2.05)	0.0842 <sup>a</sup> (4.39)
Observations	3425	3635	3933	4281	4943
Log Likelihood	-2195	-2204	-2437	-2707	-3203
Chi-Squared	201.7	211.5	188.3	185.7	305.0
Pseudo R-squared	0.0677	0.0656	0.0545	0.0479	0.0627
Wald Tests					
(1)–(3)	11.37 (0.00)	8.006 (0.01)	25.19 (0.00)	21.15 (0.00)	21.23 (0.00)
P1	0.319 (0.57)	2.555 (0.11)	0.966 (0.33)	4.038 (0.05)	4.045 (0.04)
(1)–(2)	8.541 (0.00)	17.53 (0.00)	8.100 (0.00)	2.608 (0.11)	3.047 (0.08)
P2					
(2)–(3)					
P3					

Note: The coefficients are the marginal effects of probit regressions with the absolute value of robust z-statistics in parentheses. Significance: a =  $\leq .01$ ; b =  $p \leq 0.05$ . The Wald statistics test that the marginal effects are different from each other with p-values in parentheses.

**Table B3**  
**Paid the Minimum Credit Card Payment by Age**

Variables	(1) 18–29	(2) 30–39	(3) 40–49	(4) 50–59	(5) 60–69+
Perc-Hi+Actual-Hi (1)	-0.1603 <sup>a</sup> (4.60)	-0.1259 <sup>a</sup> (3.92)	-0.1375 <sup>a</sup> (4.72)	-0.1536 <sup>a</sup> (5.99)	-0.1249 <sup>a</sup> (6.78)
Perc-Hi+Actual-Lo (2)	-0.0640 <sup>b</sup> (2.05)	-0.1374 <sup>a</sup> (4.11)	-0.0183 (0.54)	-0.0702 <sup>b</sup> (2.40)	-0.0856 <sup>a</sup> (4.26)
Perc-Lo+Actual-Hi (3)	-0.0758 <sup>a</sup> (2.62)	-0.0633 <sup>b</sup> (2.32)	-0.0587 <sup>b</sup> (2.25)	-0.0888 <sup>a</sup> (3.66)	-0.0705 <sup>a</sup> (3.81)
Male	-0.0285 (1.20)	-0.0414 (1.74)	-0.0529 <sup>b</sup> (2.42)	0.0147 (0.73)	0.0367 <sup>b</sup> (2.33)
White	-0.0440 (1.94)	0.0317 (1.36)	-0.0324 (1.32)	-0.1003 <sup>a</sup> (4.06)	-0.1620 <sup>a</sup> (6.14)
<Highschool	0.0816 (0.92)	0.0707 (0.74)	-0.0618 (0.65)	0.2179 <sup>b</sup> (2.51)	0.0633 (1.13)
=Highschool	0.1137 <sup>a</sup> (3.46)	0.1175 <sup>a</sup> (3.59)	0.0637 <sup>b</sup> (2.09)	0.0340 (1.22)	0.0244 (1.09)
Somecollege	0.1440 <sup>a</sup> (5.20)	0.0801 <sup>a</sup> (3.01)	0.0541 <sup>b</sup> (2.18)	0.0097 (0.41)	0.0236 (1.18)
Postgrad	-0.0372 (0.95)	-0.0736 <sup>b</sup> (2.41)	-0.0630 <sup>b</sup> (2.05)	-0.0359 (1.24)	-0.0152 (0.67)
Single	0.0473 (1.35)	-0.0056 (0.15)	0.0421 (1.08)	0.0291 (0.61)	0.0371 (0.71)
Divorced/sep	0.1178 (1.65)	-0.0572 (1.17)	0.0783 <sup>b</sup> (1.99)	0.0776 (1.77)	0.0396 (0.89)
Widow/er		-0.1539 (0.86)	-0.0515 (0.47)	-0.0090 (0.14)	0.0348 (0.74)
Children	0.0306 <sup>b</sup> (2.11)	0.0542 <sup>a</sup> (5.53)	0.0298 <sup>a</sup> (3.24)	0.0423 <sup>a</sup> (3.95)	0.0571 <sup>a</sup> (4.23)
Selfemployed	0.0418 (0.76)	0.0023 (0.06)	-0.0006 (0.02)	-0.0636 <sup>b</sup> (2.08)	0.0679 (1.92)
Part-time	-0.0568 (1.56)	-0.0726 (1.69)	-0.0994 <sup>b</sup> (2.52)	-0.0490 (1.48)	-0.0575 (1.95)
Homemaker	-0.0050 (0.11)	-0.1016 <sup>a</sup> (2.78)	-0.1079 <sup>a</sup> (2.86)	-0.0783 <sup>b</sup> (2.05)	-0.0592 (1.61)
Student	-0.1130 <sup>a</sup> (3.29)	0.0366 (0.48)	0.2403 <sup>a</sup> (2.52)	-0.1275 (1.01)	
Disabled	-0.0795 (0.62)	-0.1135 (1.32)	-0.0632 (1.23)	-0.0114 (0.27)	0.0294 (0.56)
Unemployed	0.0137 (0.30)	0.0118 (0.23)	-0.0340 (0.86)	-0.0436 (1.28)	-0.0984 <sup>b</sup> (2.38)
Retired		-0.1153 (0.63)	-0.0387 (0.52)	-0.1179 <sup>a</sup> (3.82)	-0.0971 <sup>a</sup> (4.09)
LiveAlone	-0.1673 <sup>a</sup> (4.31)	0.0046 (0.11)	-0.1167 <sup>a</sup> (2.97)	-0.1238 <sup>a</sup> (2.92)	-0.0636 (1.52)
LiveWithParents	-0.1044 <sup>a</sup> (2.79)	0.0248 (0.38)	-0.1962 <sup>a</sup> (3.04)	0.0071 (0.08)	0.1918 (1.23)
LiveWithOther	-0.0796 <sup>b</sup> (1.98)	0.0889 (1.49)	-0.1165 <sup>b</sup> (2.37)	-0.0411 (0.81)	0.0425 (0.88)
Income	0.0012 (0.92)	-0.0011 (0.80)	-0.0001 (0.08)	-0.0030 <sup>a</sup> (2.73)	-0.0052 <sup>a</sup> (5.93)
Income-sq	-0.0000 <sup>b</sup> (2.42)	-0.0000 (0.92)	-0.0000 (1.95)	0.0000 (1.08)	0.0000 <sup>a</sup> (3.91)
Income-drop	0.1355 <sup>a</sup> (5.74)	0.1828 <sup>a</sup> (7.85)	0.1780 <sup>a</sup> (8.18)	0.1575 <sup>a</sup> (7.87)	0.1164 (7.33)
Observations	3435	3641	3947	4297	4955
Log Likelihood	-2182	-2246	-2470	-2630	-2386
Chi-Squared	275.2	358.8	352.3	313.9	363.1
Pseudo R-squared	0.0834	0.110	0.0920	0.0843	0.104
Wald Tests					
(1)–(3)	5.441 (0.02)	4.203 (0.04)	8.750 (0.00)	7.674 (0.01)	10.16 (0.00)
P1					
(1)–(2)	6.003 (0.01)	0.0947 (0.76)	10.88 (0.00)	7.625 (0.01)	3.253 (0.07)
P2					
(2)–(3)	0.113 (0.74)	4.658 (0.03)	1.388 (0.24)	0.365 (0.55)	0.755 (0.39)
P3					

*Note:* The coefficients are the marginal effects of probit regressions with the absolute value of robust z-statistics in parentheses. Significance: a =  $\leq .01$ ; b =  $p \leq 0.05$ . The Wald statistics test that the marginal effects are different from each other with *p*-values in parentheses.

**Table B4**  
**Charged a Late Fee for Credit Card Payment by Age**

	(1)	(2)	(3)	(4)	(5)
Variables	18–29	30–39	40–49	50–59	60–69+
Perc-Hi+Actual-Hi (1)	-0.1378 <sup>a</sup> (4.43)	-0.1320 <sup>a</sup> (4.54)	-0.1117 <sup>a</sup> (4.39)	-0.112 <sup>a</sup> (5.29)	-0.0787 <sup>a</sup> (5.35)
Perc-Hi+Actual-Lo (2)	-0.0827 <sup>a</sup> (3.04)	-0.0603 <sup>a</sup> (2.00)	-0.0806 <sup>a</sup> (2.93)	-0.0590 <sup>b</sup> (2.42)	-0.0806 <sup>a</sup> (5.13)
Perc-Lo+Actual-Hi (3)	-0.0484 (1.80)	-0.0287 (1.14)	0.0002 (0.01)	-0.0309 (1.50)	-0.0372 <sup>b</sup> (2.51)
Male	-0.051 <sup>b</sup> (2.32)	-0.0685 <sup>a</sup> (3.09)	-0.0883 <sup>a</sup> (4.63)	-0.0565 <sup>a</sup> (3.28)	-0.0133 (1.07)
White	-0.0570 <sup>a</sup> (2.76)	-0.0609 <sup>a</sup> (2.79)	-0.0592 <sup>a</sup> (2.72)	-0.0500 <sup>b</sup> (2.39) <sup>b</sup>	-0.1875 <sup>a</sup> (8.25)
<Highschool	0.1109 (1.42)	-0.0645 (0.78)	0.0101 (0.12)	0.1095 (1.41)	0.0479 (1.03)
=Highschool	0.0548 (1.76)	0.0342 (1.11)	-0.0014 (0.05)	-0.0106 (0.45)	-0.0193 (1.09)
Somecollege	0.0838 <sup>a</sup> (3.20)	0.0485 (1.91)	0.0139 (0.62)	-0.0136 (0.67)	0.0020 (0.12)
Postgrad	-0.0336 (0.88)	-0.0537 (1.85)	0.0291 (1.04)	-0.0088 (0.35)	-0.0026 (0.14)
Single	0.0177 (0.54)	0.0854 <sup>b</sup> (2.41)	0.0077 (0.22)	0.0660 (1.59)	-0.0369 (0.94)
Divorced/sep	0.0452 (0.66)	0.0808 (1.76)	0.0307 (0.85)	0.0380 (1.04)	-0.0183 (0.50)
Widow		0.0270 (0.19)	0.0837 (0.82)	-0.1094 <sup>b</sup> (2.35)	-0.0230 (0.61)
Children	0.0396 <sup>a</sup> (3.19)	0.0448 <sup>a</sup> (5.03)	0.0374 <sup>a</sup> (4.75)	0.0422 <sup>a</sup> (4.72)	0.0371 <sup>a</sup> (3.74)
Selfemployed	-0.0246 (0.49)	0.0011 (0.03)	0.0647 <sup>b</sup> (2.19)	-0.0280 (1.10)	0.0376 (1.44)
Part-time	-0.0285 (0.89)	-0.0774 <sup>b</sup> (2.08)	-0.0132 (0.37)	-0.0716 <sup>a</sup> (2.63)	-0.0288 (1.23)
Homemaker	-0.0937 <sup>b</sup> (2.46)	-0.0924 <sup>a</sup> (2.77)	-0.0653 <sup>b</sup> (2.03)	-0.0984 <sup>a</sup> (3.20)	-0.0814 <sup>a</sup> (3.14)
Student	-0.0779 <sup>b</sup> (2.47)	-0.0135 (0.21)	0.1734 (1.81)	0.0564 (0.48)	
Disabled	-0.1084 (1.05)	-0.1010 (1.30)	-0.0033 (0.07)	-0.0069 (0.19)	-0.0103 (0.27)
Unemployed	0.0111 (0.28)	0.0578 (1.25)	0.0001 (0.00)	-0.0369 (1.29)	-0.0492 (1.52)
Retired	0.4673 (1.51)	0.0780 (0.33)	-0.0397 (0.62)	-0.1006 <sup>a</sup> (3.92)	-0.0628 <sup>a</sup> (3.37)
LiveAlone	-0.0596 (1.67)	-0.0761 <sup>b</sup> (2.04)	-0.0352 (0.99)	-0.0653 (1.86)	0.0122 (0.31)
LiveWithParents	-0.0158 (0.45)	-0.0866 (1.49)	-0.0511 (0.85)	0.0066 (0.09)	-0.0553 (0.61)
LiveWithOther	-0.0355 (0.96)	0.0435 (0.78)	-0.0646 (1.48)	0.0008 (0.02)	0.0766 (1.65)
Income	-0.0010 (0.78)	-0.0023 (1.89)	-0.0004 (0.32)	-0.0004 (0.42)	-0.0018 <sup>b</sup> (2.56)
Income-sq	-0.0000 (0.27)	0.0000 (1.00)	-0.0000 (0.96)	-0.0000 (0.81)	0.0000 <sup>a</sup> (2.11)
Income-drop	0.1692 <sup>a</sup> (7.77)	0.1506 <sup>a</sup> (6.94)	0.1427 <sup>a</sup> (7.37)	0.1433 <sup>a</sup> (8.34)	0.0873 <sup>a</sup> (6.76)
Observations	3437	3640	3925	4283	4958
Log Likelihood	-2000	-2155	-2196	-2238	-1876
Chi-Squared	229.4	249.8	237.2	242.1	256.2
Pseudo R-squared	0.0791	0.0853	0.0757	0.0765	0.0923
Wald Tests					
(1)–(3)	7.810 (0.01)	13.76 (0.00)	21.95 (0.00)	17.42 (0.00)	9.779 (0.00)
P1					
(1)–(2)	2.833 (0.09)	4.546 (0.03)	0.992 (0.32)	4.479 (0.03)	0.255 (0.61)
P2					
(2)–(3)	1.210 (0.27)	1.032 (0.31)	8.073 (0.01)	1.359 (0.24)	9.234 (0.00)
P3					

Note: The coefficients are the marginal effects of probit regressions with the absolute value of robust z-statistics in parentheses. Significance: a =  $\leq .01$ ; b =  $p \leq 0.05$ . The Wald statistics test that the marginal effects are different from each other with  $p$ -values in parentheses.

**Table B5**  
**Exceeded by Credit Card Limit and Charged a Fee by Age**

Variables	(1) 18–29	(2) 30–39	(3) 40–49	(4) 50–59	(5) 60–69+
Perc-Hi+Actual-Hi (1)	-0.0766 <sup>a</sup> (2.89)	-0.0938 <sup>a</sup> (4.02)	-0.0594 <sup>a</sup> (3.09)	-0.0424 <sup>b</sup> (2.45)	-0.0409 <sup>a</sup> (4.22)
Perc-Hi+Actual-Lo (2)	-0.0352 (1.53)	-0.0488 <sup>b</sup> (2.01)	-0.0418 <sup>b</sup> (2.01)	-0.0121 (0.64)	-0.0248 <sup>b</sup> (2.28)
Perc-Lo+Actual-Hi (1)	-0.0418 (1.77)	-0.0498 <sup>b</sup> (2.50)	-0.0003 (0.02)	-0.0196 (1.25)	-0.0206 <sup>b</sup> (2.08)
Male	-0.0058 (0.30)	-0.0120 (0.66)	-0.0272 (1.86)	-0.0065 (0.48)	0.0294 <sup>a</sup> (3.25)
White	-0.0360 <sup>b</sup> (2.05)	-0.0178 (0.98)	-0.0521 <sup>a</sup> (3.11)	-0.0530 <sup>a</sup> (3.21)	-0.1149 <sup>a</sup> (7.43)
<Highschool	0.0892 (1.33)	0.0259 (0.37)	0.1202 (1.70)	0.1760 <sup>a</sup> (2.68)	0.0473 (1.42)
Highschool	0.0796 <sup>a</sup> (2.88)	0.0674 <sup>b</sup> (2.57)	0.0106 (0.51)	0.0015 (0.08)	0.0185 (1.39)
Somecollege	0.0953 <sup>a</sup> (4.18)	0.0744 <sup>a</sup> (3.42)	0.0117 (0.68)	0.0021 (0.13)	0.0170 (1.47)
Postgrad	-0.0446 (1.40)	-0.0141 (0.54)	-0.0311 (1.41)	0.0129 (0.64)	0.0006 (0.04)
Single	0.0285 (1.03)	0.0297 (1.05)	0.0058 (0.21)	0.0375 (1.14)	0.0343 (0.90)
Divorced/sep	0.0676 (1.09)	0.0167 (0.46)	0.0328 (1.22)	0.0279 (0.97)	0.0080 (0.26)
Widow/er		-0.1109 (1.34)	0.0313 (0.40)	-0.0049 (0.12)	0.0371 (1.07)
Children	0.0271 <sup>a</sup> (2.61)	0.0333 <sup>a</sup> (4.47)	0.0161 <sup>a</sup> (2.62)	0.0196 <sup>a</sup> (2.88)	0.0280 <sup>a</sup> (4.79)
Selfemployed	-0.0083 (0.20)	-0.0203 (0.68)	0.0237 (1.05)	-0.0302 (1.56)	0.0205 (1.12)
Part-time	-0.0486 (1.81)	-0.0822 <sup>a</sup> (3.05)	-0.0198 (0.72)	-0.0258 (1.21)	-0.0329 <sup>b</sup> (2.45)
Homemaker	-0.0454 (1.37)	-0.0448 (1.63)	-0.0456 (1.90)	-0.0362 (1.45)	-0.0380 <sup>b</sup> (2.18)
Student	-0.0965 <sup>a</sup> (3.69)	0.0180 (0.31)	-0.0079 (0.11)	0.0345 (0.43)	
Disabled	-0.1217 (1.56)	-0.0047 (0.08)	0.0252 (0.73)	-0.0017 (0.06)	0.0087 (0.34)
Unemployed	-0.0564 (1.82)	-0.0157 (0.45)	-0.0439 (1.90)	-0.0307 (1.46)	-0.0270 (1.28)
Retired		0.2044 (1.13)	-0.0239 (0.45)	-0.0393 <sup>b</sup> (1.98)	-0.0440 <sup>a</sup> (3.50)
LiveAlone	-0.0319 (1.04)	0.0258 (0.83)	-0.0064 (0.24)	-0.0350 (1.30)	-0.0157 (0.56)
LiveWithParents	-0.0206 (0.69)	0.0434 (0.86)	-0.0376 (0.87)	0.0352 (0.60)	-0.0226 (0.40)
LiveWithOther	-0.0082 (0.25)	0.0444 (0.95)	-0.0099 (0.30)	0.0269 (0.78)	0.0133 (0.42)
Income	-0.0020 (1.95)	-0.0003 (0.34)	-0.0002 (0.29)	-0.0013 (1.70)	-0.0007 (1.59)
Income-sq	0.0000 (1.25)	-0.0000 (0.45)	-0.0000 (1.08)	0.0000 (0.56)	0.0000 (0.64)
Income-drop	0.1376 <sup>a</sup> (7.16)	0.1198 <sup>a</sup> (6.55)	0.1129 <sup>a</sup> (7.53)	0.0897 <sup>a</sup> (6.52)	0.0408 <sup>a</sup> (4.55)
Observations	3431	3635	3926	4293	4953
Log Likelihood	-1696	-1746	-1634	-1642	-1173
Chi-Squared	181.5	196.7	205.1	162.4	199.5
Pseudo R-squared	0.0699	0.0782	0.0804	0.0690	0.111
Wald Tests					
(1)–(3)	1.692 (0.19)	4.240 (0.04)	10.150 (0.00)	2.005 (0.16)	5.285 (0.02)
P1					
(1)–(2)	2.166 (0.14)	2.877 (0.09)	0.536 (0.46)	2.181 (0.14)	1.936 (0.16)
P2					
(2)–(3)	0.0601 (0.81)	0.00 (1.00)	3.506 (0.06)	0.141 (0.71)	0.222 (0.64)
P3					

*Note:* The coefficients are the marginal effects of probit regressions with the absolute value of robust  $z$ -statistics in parentheses. Significance: a =  $\leq .01$ ; b =  $p \leq 0.05$ . The Wald statistics test that the marginal effects are different from each other with  $p$ -values in parentheses.