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*Debt literacy, financial experiences, and overindebtedness**

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Abstract

We analyze a national sample of Americans with respect to their debt literacy, financial experiences, and their judgments about the extent of their indebtedness. Debt literacy is a component of broader financial understanding that measures knowledge about debt and self-assessed financial knowledge. Financial experiences are the participants' reported experiences with traditional borrowing, alternative borrowing, and investing. Overindebtedness is a self-reported measure. Debt literacy is low, with only about one-third of the population grasping the basics of interest compounding. Even after controlling for demographics, we find a relationship between debt literacy and both financial experiences and debt loads. Individuals with lower levels of debt literacy tend to transact in high-cost manners, incurring higher fees and using high-cost borrowing. We provide a rough estimate of the national implications of debt ignorance on credit card costs by consumers. Less knowledgeable individuals also report that their debt loads are excessive or that they are unable to judge their debt position.

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1 Introduction

Financial knowledge has become more essential today than in the past as financial markets offer more complex choices and as the responsibility for saving for the future shifts from government and employers to individuals. Credit crises of the recent past show that consumers' borrowing decisions are also critical. The rapid growth in household debt and its link to the recent financial crisis raises the question of whether individuals' lack of financial knowledge led them to take out mortgages and incur credit card debt they could not afford.

To fill the research gap and assess how much knowledge individuals have with respect to debt, we designed and fielded a new survey focused specifically on 'debt literacy,' which we define as the ability to make simple decisions regarding debt, applying basic knowledge about interest compounding to everyday financial choices.

While substantial research exists on financial literacy, relatively little work has been done on debt literacy. Bernheim (1995, 1998) was among the first to document that many US consumers display low levels of financial literacy. Hilgert *et al*. (2003) report that most Americans fail to understand basic financial concepts, particularly those relating to bonds, stocks, and mutual funds. Lusardi and Mitchell's (2008, 2011*a*) module on planning and financial literacy for the 2004 Health and Retirement Study (HRS) provides further evidence of financial illiteracy. They find that many older (50+) individuals cannot do simple interest rate calculations, such as determining how money would grow at an interest rate of 2%, and do not know about the workings of inflation and risk diversification. Similar findings are seen more recently in a representative sample of US respondents from the National Financial Capability Study (Lusardi and Mitchell, 2011*c*). Other work on financial literacy in the US and internationally is summarized in the survey by Lusardi and Mitchell (2014). All of this work covers concepts related to saving and investment, but little has been done in the context of debt.

Financial literacy is important because it has been linked to saving behavior and portfolio choice. For example, the less financially literate are found to be less likely to plan for retirement (Lusardi and Mitchell, 2007, 2008, 2011*a*, *c*), to accumulate wealth (Stango and Zinman, 2009), and to participate in the stock market (Christelis *et al*., 2010; van Rooij *et al*., 2011; Yoong, 2011). Moreover, less financially literate individuals are less likely to choose mutual funds with lower fees (Hastings and Tejeda-Ashton, 2008).[1] Some work has looked at debt behavior, often connecting financial knowledge to just one type of transaction. For example, Moore (2003) reports that respondents with lower levels of financial literacy are more likely to have costly mortgages. Similarly, Campbell (2006) reports that individuals with lower incomes and lower education levels – characteristics that are strongly related to financial literacy – are less likely to refinance their mortgages during a period of falling interest rates.

In our work, we build upon the previous literature in three ways. First, we design a set of questions to measure knowledge of concepts related to debt; we name that

[1] Financial knowledge is also found to be linked to the ability to budget, save money, and control spending (Perry and Morris, 2005).

knowledge 'debt literacy,' as it explicitly relates to debt and debt instruments. Second, we propose a method to consider a large set of financial experiences in which individuals engage: opening a checking account, buying bonds and stocks, and borrowing from traditional and alternative credit providers. We translate the rich multidimensional set of experiences into a few consumer segments using factor analysis and we examine the link between debt literacy and these behavioral groups. By looking at multiple financial behaviors, we provide a much richer picture of the financial lives of individuals than was done in previous studies. While we do not have information about the values of assets and debt on household balance sheets, we ask survey participants to assess their comfort with handling their current debt level. We link that assessment to debt literacy and find that low debt literacy is correlated with self-assessed overindebtedness, as well as with modes of financial behavior captured in our factor-analysis segments. Third, and finally, we provide a rough estimate of the cost of ignorance with respect to debt, focusing specifically on credit card behavior.

In our empirical work, we find strikingly low levels of debt literacy across the US population. Only one-third of respondents in the population can apply concepts of interest compounding to everyday situations or understand the workings of credit cards. Debt illiteracy is particularly severe among women, the elderly, minorities, and those who are divorced or separated. We identify four different groups of individuals on the basis of common financial experiences – *pay in full, borrowers/savers, fee-payers*, and *alternative financial services (AFS) users* – and find that debt literacy is related to these modes of financial behavior. For example, fee-payers (e.g., those who make only minimum payments on their credit card bills and incur late and over-the-limit fees) and alternative financial services users are less debt literate, even after controlling for many individual characteristics. Similarly, the less financially knowledgeable pay a sizeable share of credit card charges and fees. Perhaps as much as one-third of the charges and fees paid by the less knowledgeable are related to lack of financial knowledge versus other observable demographic factors.

We also find a link between debt literacy and overindebtedness: those with lower levels of debt literacy tend to judge their debt as excessive or report that they are unsure about the appropriateness of their debt position, even after controlling for many demographic factors. Not surprisingly, what you do not know *can* hurt you. Well before the financial crisis raged, more than a quarter of Americans judged their debt to be excessive. We believe these results suggest that lack of financial skills is and continues to be a cause for concern.

2 Methodology and survey design

We partnered with a leading commercial market research firm, Taylor Nelson Sofres (TNS) Global, to develop and administer a survey that reports information on consumers' financial knowledge related to debt, demographic characteristics, financial experiences, and judgments about their indebtedness.

Our approach to measuring debt literacy has three elements. First, we ask questions to assess understanding of key concepts; i.e., knowledge and skills related to taking on

and managing debt, such as an understanding of interest compounding.[2] Debt literacy questions can be solved with simple reasoning and do not require a calculator. Second, we take into consideration preferences regarding fixed monthly payments, often a very expensive way to pay for goods and services, but that many consumers seem to prefer even if it may be cheaper to borrow and repay in one lump sum. Third, we ask participants to judge their financial knowledge, and relate this self-assessment to their performance on the debt literacy questions.

The survey was fielded in November 2007 by the staff of TNS Global. The data were collected via a phone interview from a sample of 1,000 US residents. The survey collected information on a number of self-reported demographic characteristics, such as age, gender, race and ethnicity, marital status, employment, region of residence, family size and type, income, and wealth.[3]

3 Measuring debt literacy

While there are a few national surveys that measure financial knowledge in the United States, such as the HRS, the Rand American Life Panel (ALP), and the Survey of Consumers,[4] few ask questions that focus specifically on borrowing and debt behavior. Our survey included three new questions designed to measure debt literacy. Specifically, respondents were asked questions that assessed their knowledge about the power of interest compounding and the workings of credit card debt and their preference for means of payment, given two options.[5] Tallying respondents' correct and incorrect responses allowed us to classify individuals according to their respective levels of financial knowledge and to evaluate the link between financial knowledge and borrowing behavior.

The first question, measuring interest compounding, is as follows:

Suppose you owe $1,000 on your credit card and the interest rate you are charged is 20% per year compounded annually. If you did not pay anything off, at this interest rate, how many years would it take for the amount you owe to double?

(i) 2 years;
(ii) Less than 5 years;
(iii) 5–10 years;
(iv) More than 10 years;
(v) Do not know;
(vi) Prefer not to answer.

[2] Given the information collected in the literacy questions, we are not able to distinguish between pure financial knowledge and ability, including numeracy and cognitive ability – an issue that can be important when considering the elderly and those with low educational attainment. Thus, we use the terms "financial literacy" and "debt literacy" to encompass all of these characteristics. However, in our empirical work, we always account for income and wealth. Thus, our measures of literacy will capture knowledge and ability above and beyond what is accounted for by income and wealth.

[3] See the description of the survey and the variables used in our work in the Appendix.

[4] These surveys cover adults. Surveys of high school students include those by the Jump$tart Coalition for Personal Financial Literacy and the National Council for Economic Education (which has become the Council for Economic Education).

[5] In this survey, we were limited to three questions only.

Ignoring interest compounding, borrowing at 20% per year would lead to doubling in 5 years; someone who knew about interest on interest might have selected a number less than 5; someone who knows the 'rule of 72' heuristic would know that it would be about 3.6 years (i.e., correct answer (ii) 'less than 5 years'). Answers (iii) and (iv) reflect a misunderstanding of the concept of interest accrual. Table 1, panel A, reports the responses to this question. Fewer than 36% of respondents answered this question correctly, consistent with the evidence reported in Lusardi and Mitchell (2007) that only a small fraction of respondents between the ages of 51 and 56 can correctly perform an interest-compounding calculation when asked to report how the amount in a savings account would grow over a 2-year period at an interest rate of 10%. The larger fraction, 43%, performed only a simple interest rate calculation, without taking into account that interest grows on interest. What we know from psychology and marketing is confirmed here: many people are not numerate and have difficulty grasping percentages (Chen and Rao, 2007; Peters *et al.*, 2007).

The evidence reported in panel A points to two other results. First, a sizable proportion of respondents, close to 20%, reported that they 'do not know' the answer to this question. As reported in other papers (Lusardi and Mitchell, 2011*a*, *b*, *c*; van Rooji *et al.*, 2011), 'do not know' answers identify respondents with the lowest level of financial knowledge. Second, more than 30% of respondents overestimated, sometimes by a wide margin, the number of years it would take for debt to double when borrowing at a high rate. Overall, while many individuals deal frequently with credit cards and credit card debt, there seems to be limited knowledge of interest compounding.

We find similar evidence from the second literacy question, which asks respondents to calculate how many years it would take to pay off credit card debt when making minimum payments equal to the interest payments on the outstanding debt. Given that one is only paying interest, the principal balance will never decline. The exact wording of the question is as follows:

You owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?

(i) Less than 5 years;
(ii) Between 5 and 10 years;
(iii) Between 10 and 15 years;
(iv) Never, you will continue to be in debt;
(v) Do not know;
(vi) Prefer not to answer.

Table 1, panel B, shows that only slightly more than 35% of respondents appreciated that making minimum payments equal to the interest payment on the outstanding debt will never eliminate debt. Not surprisingly, responses to the first two questions are highly correlated. More than half (56%) of those who responded correctly to the first question also responded correctly to the second question. 'Do not know'

Table 1. *TNS survey debt literacy questions: weighted results*

		Age					Gender		Household income			
	Total	<30	31–40	41–50	51–65	>65	Male	Female	Under $30,000	$30,000–$49,999	$50,000–$74,999	Above $75,000
Panel A: First debt literacy question												
Suppose you owe $1,000 on your credit card and the interest rate you are charged is 20% per year compounded annually. If you did not pay anything off, at this interest rate, how many years would it take for the amount you owe to double?												
2 years	9.6%	9.7%	13.8%	9.6%	6.7%	9.8%	8.5%	10.6%	13.6%	6.9%	10.3%	6.4%
Less than 5 years (correct)	35.9%	43.2%	33.4%	34.2%	38.0%	28.6%	46.3%	25.5%	25.6%	32.4%	38.7%	48.4%
Between 5 and 10 years	18.8%	22.4%	20.2%	21.0%	15.7%	15.9%	16.1%	21.5%	18.2%	19.4%	20.3%	18.1%
More than 10 years	13.1%	5.0%	10.7%	14.4%	18.1%	11.3%	14.1%	12.2%	10.3%	18.2%	17.3%	10.2%
Do not know	18.3%	16.2%	16.1%	19.2%	16.3%	28.4%	11.4%	25.2%	26.5%	18.1%	11.4%	13.5%
Prefer not to answer	4.3%	3.5%	5.8%	1.7%	5.1%	6.0%	3.6%	5.1%	6.0%	5.0%	2.1%	3.4%
Number of observations	1,000	141	189	226	328	116	505	495	264	163	193	380
Panel B: Second debt literacy question												
You owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?												
Less than 5 years	3.8%	6.8%	2.8%	4.5%	3.6%	1.1%	2.0%	5.6%	6.3%	1.3%	1.7%	4.1%
Between 5 and 10 years	12.4%	15.9%	13.6%	11.1%	10.9%	12.9%	11.4%	13.4%	15.4%	10.8%	13.6%	9.4%
Between 10 and 15 years	21.6%	20.5%	24.3%	23.2%	21.4%	15.3%	21.3%	21.8%	16.2%	25.5%	26.3%	21.9%
Never, continue to be in debt (correct)	35.4%	36.1%	31.5%	33.9%	39.8%	32.4%	45.0%	25.8%	28.0%	35.4%	36.6%	43.2%
Do not know	21.7%	17.0%	20.1%	24.7%	19.3%	30.7%	15.7%	27.7%	28.1%	21.9%	19.4%	15.6%
Prefer not to answer	5.1%	3.7%	7.8%	2.6%	4.9%	7.7%	4.6%	5.6%	6.1%	5.0%	2.5%	5.7%
Number of observations	1,000	141	189	226	328	116	505	495	264	163	193	380

Table 1 (*cont.*)

		Age					Gender		Household income			
	Total	<30	31–40	41–50	51–65	>65	Male	Female	Under $30,000	$30,000–$49,999	$50,000–$74,999	Above $75,000
Panel C: Third debt literacy question												
You purchase an appliance which costs $1,000. To pay for this appliance, you are given the following two options: (a) pay 12 monthly installments of $100 each (b) borrow at a 20% annual interest rate and pay back $1,200 1 year from now. Which is the more advantageous offer, in other words, which one will cost less?												
Option (a)	40.6%	43.0%	41.7%	40.0%	39.9%	39.0%	36.3%	45.0%	46.0%	39.7%	39.2%	36.0%
Option (b) (correct)	6.9%	6.5%	6.2%	7.7%	7.5%	5.8%	9.3%	4.6%	3.7%	5.9%	8.9%	10.1%
They are the same	38.8%	37.5%	41.3%	37.2%	39.5%	37.6%	44.6%	33.0%	32.8%	41.9%	41.6%	41.8%
Do not know	9.2%	9.9%	5.0%	11.1%	9.5%	10.8%	5.3%	13.0%	12.3%	8.0%	6.6%	8.1%
Prefer not to answer	4.5%	3.2%	5.9%	4.0%	3.6%	6.9%	4.5%	4.4%	5.2%	4.6%	3.7%	4.0%
Number of observations	1,000	141	189	226	328	116	505	495	264	163	193	380
Panel D: Self-assessed financial knowledge												
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?												
1 = very low	2.0%	2.60%	3.00%	1.60%	1.80%	0.90%	1.80%	2.20%	4.70%	0.60%	0.90%	0.50%
2	2.9%	2.60%	0.70%	3.70%	3.90%	2.80%	2.50%	3.20%	4.60%	4.10%	1.40%	1.10%
3	7.7%	8.80%	10.50%	9.90%	5.70%	3.20%	6.60%	8.80%	10.80%	7.00%	5.50%	6.20%
4	19.5%	27.20%	26.70%	18.10%	15.50%	12.10%	16.70%	22.50%	24.10%	18.40%	15.40%	17.90%
5	31.9%	30.40%	31.20%	27.70%	36.20%	30.80%	32.30%	31.50%	26.70%	30.50%	40.30%	33.40%
6	18.9%	12.60%	14.80%	20.20%	19.20%	30.70%	22.60%	15.30%	12.80%	19.70%	21.80%	23.80%
7 = very high	10.7%	9.20%	7.70%	12.40%	9.90%	16.30%	11.50%	9.80%	8.00%	9.90%	11.10%	14.00%
Do not know	2.3%	3.80%	0.70%	3.20%	2.20%	1.70%	1.90%	2.60%	2.50%	5.10%	1.50%	0.50%
Prefer not to answer	3.9%	2.70%	4.70%	3.10%	5.50%	1.30%	3.80%	4.00%	5.70%	4.50%	2.10%	2.60%
Average score	4.88	4.66	4.67	4.89	4.93	5.33	5.01	4.74	4.45	4.91	5.1	5.17
Number of observations	1,000	141	189	226	328	116	505	495	264	163	193	380

Note: The average score excludes the survey answers 'Do not know' and 'Prefer not to answer'.

responses exhibit an even higher correlation, with 80% of those who respond 'do not know' to the first question responding similarly to the second question.

The third question seeks to determine not only whether people understand the notion of the time value of money and how skillful they are in comparing payment options, but also their preference for fixed payment, a very common feature of many contracts, which could reflect behavioral biases, such as lack of self-control, as argued by Meier and Sprenger (2010):

You purchase an appliance which costs $1,000. To pay for this appliance, you are given the following two options: (a) pay 12 monthly installments of $100 each; (b) borrow at a 20% annual interest rate and pay back $1,200 a year from now. Which is the more advantageous offer, in other words, which one will cost less?

(i) Option (a);
(ii) Option (b);
(iii) They are the same;
(iv) Do not know;
(v) Prefer not to answer.

By paying $100 a month (versus $1,200 at the end of the year), one foregoes interest that could have accrued by having kept those dollars. Consistent with the findings of Stango and Zinman (2009) that individuals are systematically biased toward underestimating the interest rate out of a stream of payments, we find that a very small proportion of respondents – close to 7% – selected the 'lowest cost' option, (b) (Table 1, panel C). A very high fraction of respondents, 40%, chose option (a) even though its Annual Percentage Rate is about 35% versus the 20% in option (b). About 39% thought that the two payment options were the same, ignoring the time value of money. Overall, these results suggest that individuals may underestimate the interest rate at which they are borrowing or exhibit behavioral biases or may pay for budgeting assistance.[6]

To summarize: debt illiteracy is widespread. Only one-third of respondents can correctly answer a question about the power of interest compounding or about the workings of credit cards. Consumers choose expensive methods of payment, either because they do not do any calculations when choosing their methods of payment or because they suffer from behavioral biases, which also result in expensive borrowing. This evidence provides some reason for concern in an economy in which consumers routinely borrow and save using debt-like instruments.

3.1 Who is more debt literate?

As we report below, debt illiteracy is not only widespread but is particularly acute in specific demographic groups.

[6] Given the low correct response rate in all questions, one may wonder whether the framing of the question influences the way individuals respond. We are not able to address this issue in this survey. However, the evidence in other modules on financial literacy that one of the authors designed indicates that the framing of the questions matters for questions measuring advanced rather than basic financial knowledge (see Lusardi and Mitchell 2009, and van Rooij *et al.*, 2011). When evaluating the empirical work, one has to keep in mind that financial knowledge is always measured with error.

Table 1 (panels A, B, and C) shows the distribution of the responses to the literacy questions across age, gender, and income. The elderly (those older than 65) display the lowest amount of knowledge about interest compounding. Not only were they less likely to answer this question correctly but they were also more likely to answer 'do not know.' On the opposite end of the distribution, young respondents (younger than age 30) performed best on the first question, but not as well on the second and third questions. Thus, debt literacy is low among the young, too. While in a single cross-section we cannot differentiate between age and cohort effects, differences in literacy are sizable across age/generations.

There are sharp differences between male and female debt literacy levels. In each of the three questions, women were much less likely to respond correctly than were men, sometimes by as much as 20 percentage points. The reason for such difference is that women were disproportionately more likely than men to state that they did not know the answer to the literacy questions, a finding which has been confirmed in many surveys around the world (Lusardi and Mitchell, 2014).

Debt literacy increases sharply with income. While close to 50% of respondents with income above $75,000 answered the first question correctly and 43% answered the second question correctly, only a little more than 25% of respondents whose income is below $30,000 answered these two questions correctly. For brevity, we do not report the figures, but we find that debt literacy is lower among respondents with low wealth; those who are divorced, widowed, or separated; and among African-Americans and Hispanics.

The findings reported in Table 1 do not change when considering multivariate regressions. We perform an analysis of the debt literacy variables, including dummies for age groups, for being female, for being African-American and Hispanic (the reference group is white respondents), and for marital status (the reference group is married respondents). We also add dummies for household income and household wealth. Age continues to be statistically significant; the elderly display less understanding of interest compounding and the workings of credit cards. Women are still found to be less knowledgeable than men. Race and income also continue to be powerful correlates of debt literacy.[7]

3.2 Who thinks *they are financially knowledgeable?*

In addition to asking questions about some specific concepts related to debt, we also asked respondents to judge their financial knowledge. The wording of this self-assessment is as follows:

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?

We asked this question for several reasons. First, our questions on debt literacy cover specific concepts, but they hardly exhaust the list of topics that can affect debt behavior. This question asks about 'overall financial knowledge' and thus is more expansive. Second, we can evaluate and compare the answers to this self-reported measure of

[7] For brevity, these estimates are not reported but are available from the authors upon request.

financial knowledge with the answers to more objective measures to determine whether people know how much they know. Third, it provides respondents with a straightforward and easy-to-answer question.[8]

Table 1, panel D, reports the answers to the self-reported financial knowledge question across the whole sample. Contrary to the results reported in the prior section, most respondents judge themselves above average in terms of their financial knowledge. The average score in the sample is 4.88 out of 7, and more than 50% of respondents chose a score as high as 5 or 6. Conversely, only a little more than 10% of respondents chose a score below 4, a striking fact given the relatively poor performance of respondents in answering questions assessing debt literacy.

In general, the patterns of self-reported financial knowledge correlate with our measures of debt literacy, suggesting self-awareness. For example, women's self-reported levels of financial knowledge are much lower than men's levels. African-Americans and Hispanics also give lower self-assessments, even though differences in self-reported financial knowledge across race and ethnicity are less sharp than across the three measures of debt literacy. Self-reported financial knowledge increases steadily with income, a finding reported in the questions measuring debt literacy as well.

Nevertheless, there are some notable discrepancies between self-reported financial knowledge and actual measures of debt literacy. While the elderly display very low levels of debt literacy across the three questions, they rank themselves highest in terms of financial knowledge: the average score among respondents older than 65 is as high as 5.33. This self-confidence combined with lack of skill or cognition could put the elderly at risk for making financial mistakes or being victims of scams.

4 Measuring financial experiences

Individuals engage in many different types of borrowing and lending financial transactions. We seek to characterize their behaviors broadly and relate them to levels of debt literacy. We expect to see a negative relationship between financial skills and certain wealth-depleting financial behaviors.[9]

Experience measures. The TNS survey allows us to characterize a wide range of borrowing and investing experiences and transaction patterns of respondents. While we cannot measure their intensity or frequency, we can identify the types of transactions in which individuals have engaged.[10] Our typology includes four types of transactions: traditional borrowing, alternative financial services borrowing, saving/investing, and credit card use. The parenthetical text below was not part of the survey, but it is provided here to organize this information for the reader.

(1) *(Experience with traditional borrowing, excluding credit cards.)* Have you ever...
   a. Taken out a loan for student education

[8] This question was asked to respondents before the three debt literacy questions.
[9] Financial experience could also affect financial knowledge, and we will discuss this issue in more detail in the empirical work.
[10] The failure to engage in certain transactions could, of course, also be a function of individual choice or of supply constraints, i.e., the product was not available to the individual. For example, some may not have credit cards by choice, while others might be unable to obtain a credit card.

b. Taken out an auto loan
c. Taken out a home equity loan
d. Gotten (or refinanced) a mortgage

(2) *(Experience with alternative financial services borrowing.)* Have you ever...
a. Gotten a short-term 'payday' or 'salary advance' loan
b. Gotten a 'refund anticipation loan' to accelerate the receipt of your taxes
c. Gotten an auto title loan
d. Used a pawn shop
e. Bought goods on a layaway plan or at a rent-to-own store

(3) *(Experience with saving/investing and payments.)* Have you ever...
a. Opened a checking or debit card account
b. Opened a savings account or bought a CD
c. Bought a savings bond or other bonds
d. Invested in mutual funds
e. Invested in individual stocks

(4) *(Typical transaction mode for credit cards.)* In the last 12 months, which of the following describes your use of credit cards?
a. I do not have any credit cards or did not use them
b. In some months, I ran an outstanding balance and paid finance charges
c. In some months, I paid the minimum payment only
d. In some months, I was charged a late charge for late payments
e. In some months, I was charged an over the limit charge for charging more than my credit limit
f. In some months, I used the cards for a cash advance
g. My account was closed down by the credit card company
h. I always paid my credit cards in full

While not exhaustive, this list includes many of the transactions which require a person to consider interest or fees.[11] Table 2 provides the weighted incidences of the various transaction types for our sample population. Some activities are quite common – 91% of the population has experience with checking accounts, 81% has experience with savings accounts or CDs, and 79% currently has credit cards. Other activities are fairly rare. For example, in our sample only 4.4% had ever gotten a refund anticipation loan, 6.5% had ever had an auto title loan, and 7.8% had ever taken out a payday loan. As for credit cards, some (20%) do not have a card or do not use them. However, a majority of respondents use credit cards and do not pay the balances in full each month.

Experience segments. We use this information to segment individuals into separate groups. This segmentation is carried out solely on the basis of transaction activity, without referring to demographics or other variables. We used cluster analysis to determine which groups of individuals have had similar financial experiences.[12]

[11] Because of space constraints, we could not include other choices, such as the use of bank overdraft lines, car leases, annuities, and other insurance products.
[12] A description of the factor analysis is provided in the Appendix.

Table 2. *Financial experience measures, total sample*

In the last 12 months, which of the following describes your use of credit cards?	Short name	Sample mean	Sample SD
I do not have any credit cards or did not use them	CC None	0.206	0.405
In some months, I ran an outstanding balance and paid finance charges	CC Balance	0.308	0.462
In some months, I paid the minimum payment only	CC Min	0.213	0.410
In some months, I was charged a late charge for late payment	CC Late	0.076	0.265
In some months, I was charged an over the limit charge for charges exceeding my credit line	CC OTL	0.044	0.206
In some months, I used the cards for a cash advance	CC Advance	0.052	0.223
My account was closed down by the credit card company	CC Closed	0.015	0.122
I always paid my credit cards in full	CC PIF	0.368	0.482
Which of the following financial transactions have you EVER done?			
I opened a checking or debit card account	Checking	0.914	0.280
I opened a savings account or bought a CD	Savings/CD	0.806	0.395
I invested in mutual funds	Mutual fund	0.388	0.488
I invested in individual stocks	Stocks	0.341	0.474
I bought savings bonds or other bonds	Bonds	0.349	0.477
I took out a loan for student education	Loan: Stu	0.270	0.444
I took out an auto loan	Loan: Auto	0.637	0.481
I took out a home equity loan	Loan: HE	0.305	0.461
I got (or refinanced) a mortgage	Loan: Mort	0.493	0.500
I got a short term 'payday' or 'salary advance' loan	Loan: Payday	0.078	0.269
I got a 'refund anticipation loan' to accelerate the receipt of my tax payments	Loan: Refund	0.044	0.204
I got an auto title loan	Loan: Title	0.065	0.247
I used a pawn shop	Loan: Pawn	0.107	0.310
I bought goods on a layaway plan or at a rent-to-own store	Layaway/ Rent	0.191	0.393

This table reports the mean and standard deviation of the frequencies of the various financial experiences by 1,000 survey respondents. All frequencies are weighted. The survey was conducted in November 2007 by TNS Global.

Based on the results of the cluster analysis, we reliably identify four main segments defined by common experiences. Table 3 provides the transaction characteristics of the four groups. While we 'name' these clusters for the sake of exposition, these names cannot fully characterize the range of behaviors that these groups share. Cluster 1, comprising about 26% of the sample, are people firmly engaged in the traditional financial system. These individuals all have credit cards but do not carry any revolving balances. This is such a distinctive characteristic that, for descriptive

Table 3. *Financial experience segments*

		Experience segments							
		1: Pay in full		2: Borrowers/ savers		3: Pay fees		4: AFS users	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
In the last 12 months, which of the following describes your use of credit cards?	Short name								
I do not have any credit cards or did not use them	CC None	0.000	0.000	0.000	0.000	0.002	0.047	0.680	0.467
In some months, I ran an outstanding balance and paid finance charges	CC Balance	0.010	0.100	0.947	0.225	0.600	0.491	0.015	0.123
In some months, I paid the minimum payment only	CC Min	0.010	0.102	0.273	0.447	0.559	0.497	0.008	0.090
In some months, I was charged a late charge for late payment	CC Late	0.019	0.137	0.115	0.321	0.174	0.380	0.009	0.093
In some months, I was charged an over the limit charge for charges exceeding my credit line	CC OTL	0.000	0.000	0.060	0.238	0.118	0.324	0.000	0.000
In some months, I used the cards for a cash advance	CC Advance	0.000	0.000	0.015	0.120	0.161	0.368	0.000	0.000
My account was closed down by the credit card company	CC Closed	0.005	0.067	0.007	0.084	0.042	0.201	0.000	0.000
I always paid my credit cards in full	CC PIF	0.988	0.111	0.037	0.188	0.036	0.186	0.296	0.457
Which of the following financial transactions have you EVER done?	Short name								
I opened a checking or debit card account	Checking	0.977	0.151	0.991	0.095	0.939	0.241	0.805	0.397
I opened a savings account or bought a CD	Savings/CD	0.949	0.221	0.982	0.135	0.797	0.403	0.622	0.486
I invested in mutual funds	Mutual fund	0.723	0.448	0.839	0.369	0.156	0.363	0.156	0.364
I invested in individual stocks	Stocks	0.640	0.481	0.825	0.381	0.119	0.324	0.119	0.325
I bought savings bonds or other bonds	Bonds	0.625	0.485	0.646	0.480	0.226	0.419	0.116	0.321
I took out a loan for student education	Student loan	0.201	0.402	0.462	0.500	0.334	0.473	0.189	0.393
I took out an auto loan	Auto loan	0.770	0.422	0.940	0.238	0.657	0.476	0.380	0.486
I took out a home equity loan	Home equity	0.485	0.501	0.538	0.500	0.251	0.434	0.111	0.314
I got (or refinanced) a mortgage	Mortgage	0.798	0.402	0.774	0.420	0.444	0.498	0.166	0.373
I got a short term 'payday' or 'salary advance' loan	Payday loan	0.024	0.154	0.084	0.279	0.079	0.271	0.122	0.328

I got a 'refund anticipation loan' to accelerate the receipt of my tax payments	Refund loan	0.004	0.067	0.047	0.213	0.049	0.216	0.071	0.258
I got an auto title loan	Auto title loan	0.047	0.212	0.118	0.324	0.063	0.243	0.064	0.244
I used a pawn shop	Pawn	0.019	0.138	0.135	0.344	0.103	0.304	0.178	0.383
I bought goods on a layaway plan or at a rent-to-own store	Layaway/Rent	0.064	0.246	0.248	0.433	0.228	0.420	0.240	0.428
Weighted share of sample		26.6%		11.8%		31.4%		30.2%	
Number of observations (unweighted)		292		130		305		273	

This table reports the incidences of various financial experiences, conditional on assignment to one of the four experience clusters. The clusters were defined with reference to these experiences and not on the basis of demographic or debt literacy information.

purposes, we use the name 'pay in full' to identify this cluster. These people have relatively high (but not the highest) levels of experience with mutual funds, stocks, and bonds. With respect to the other clusters, respondents in cluster 1 are most likely to have a mortgage and are fairly likely to have some experience with auto loans and home equity loans. Moreover, they have the lowest levels of alternative financial services usage.

At the other end of the spectrum (cluster 4) is the 30% of our sample that does not use traditional financial services as often as the others. For descriptive purposes, we name them 'users of alternative financial services' or 'AFS users' in brief. For example, when compared with cluster 1, their usage of alternative financial services is considerably more frequent, using payday loans, tax refund loans, and pawn shops 5, 16, and 9 times more frequently. Most individuals in this cluster (68%) do not have credit cards and are more likely to be 'unbanked.' At the same time, the likelihood that they have ever invested in a stock, a bond, or a mutual fund – or held a mortgage – is about one-fifth that of the pay in full group.

In between are two groups that comprise 43% of the sample. Almost all have credit cards and virtually all carry revolving balances most months. They are virtually all 'banked.' The smaller subgroup, accounting for about 12% of the sample, is comprised of what we call the 'borrowers/savers' (cluster 2). This group has the highest level of experience with savings and investments of any of the four clusters. At the same time, this group has the highest levels of debt exposure too, with the most frequent experience with student loans (46%), home equity loans (54%), auto loans (94%), and virtually the same levels of mortgage loans as the pay in full group (77%). This group seems much more extended than the pay in full group in their credit card behavior.

The final 31% of the sample is what we call the 'pay fees' group (cluster 3). Relative to the three other groups, this group has the highest likelihood of paying the minimum amount due on their credit cards (56%), running late fees on their credit cards (17%), incurring over-the-limit fees (11.8%), and using their cards to get cash advances (16.1%). At the same time, they have far less experience than the borrowers/savers or the pay in full group with respect to mutual funds, stocks, or bonds, as well as less experience than these other groups with home equity loans, mortgages, and auto loans.

4.1 Characteristics by experience segment: demographics and debt literacy

Having created these experience segments, it is then natural to determine if there is a relationship between demographics, debt literacy, and these clusters. Are those in the pay in full group financially better off (e.g., in terms of income or wealth), more financially knowledgeable, and/or more secure in their level of indebtedness? Are the AFS users financially worse off, less financially literate, and/or less secure in their level of indebtedness? Finally, who are the fee payers? Table 4 provides descriptive statistics for these four clusters with respect to their demographics (panel A) and debt literacy (panel B). Following this discussion, we report the results of a multinomial logit analysis which examines cluster assignment as a function of all these factors.

Table 4. *Characteristics of financial experience segments*

	Total sample		Experience segments							
			1: Pay in full		2: Borrowers/ savers		3: Pay fees		4: AFS users	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Panel A: demographics										
Age	47.8	14.4	53.1	14.4	49.5	12.9	45.1	13.3	45.4	14.9
Female	50.0%	50.0%	43.5%	49.7%	37.8%	48.7%	52.4%	50.0%	58.0%	49.5%
White	85.0%	35.7%	91.1%	28.6%	87.4%	33.3%	80.8%	39.4%	83.1%	37.5%
Black	6.4%	24.6%	2.1%	14.2%	5.2%	22.2%	10.5%	30.7%	6.6%	24.9%
Hispanic	3.6%	18.7%	1.5%	12.3%	1.4%	11.8%	4.9%	21.5%	5.1%	22.0%
Married	64.0%	48.0%	74.3%	43.8%	72.8%	44.7%	62.6%	48.5%	53.1%	50.0%
Single	16.0%	36.7%	9.5%	29.4%	8.6%	28.2%	16.9%	37.6%	23.7%	42.6%
Separated	19.9%	40.0%	16.2%	36.9%	18.6%	39.1%	20.5%	40.4%	23.2%	42.3%
Household income										
Under $30,000	32.8%	47.0%	16.7%	37.3%	10.2%	30.4%	35.8%	48.0%	52.9%	50.0%
$30,000–$49,999	20.4%	40.3%	20.1%	40.1%	17.3%	38.0%	21.1%	40.8%	21.3%	41.0%
$50,000–$74,999	18.2%	38.6%	20.2%	40.3%	30.8%	46.3%	17.5%	38.0%	12.3%	32.9%
Above $75,000	28.5%	45.2%	43.0%	49.6%	41.7%	49.5%	25.7%	43.8%	13.6%	34.3%
Not employed	13.9%	34.6%	7.9%	27.0%	7.0%	25.6%	12.7%	33.3%	23.2%	42.3%
Financial assets:										
Under $50,000	58.2%	49.3%	26.5%	44.2%	47.9%	50.1%	76.1%	42.7%	71.6%	45.2%
$5–$100,000	13.1%	33.8%	18.1%	38.6%	18.9%	39.3%	9.2%	29.0%	10.4%	30.6%
$100–$250,000	11.6%	32.0%	19.1%	39.3%	13.4%	34.2%	9.6%	29.5%	6.3%	24.4%
Over $250,000	17.1%	37.7%	36.3%	48.2%	19.8%	40.0%	5.1%	22.0%	11.6%	32.1%

Table 4 (*cont.*)

	Total sample		Experience segments							
			1: Pay in full		2: Borrowers/ savers		3: Pay fees		4: AFS users	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Panel B: debt literacy										
Question 1										
% correct	35.9%	48.0%	44.7%	49.8%	46.7%	50.1%	34.9%	47.7%	24.9%	43.3%
% do not know	18.3%	38.7%	11.7%	32.2%	10.4%	30.7%	23.6%	42.5%	21.7%	41.3%
Question 2										
% correct	35.4%	47.8%	42.0%	49.4%	46.1%	50.0%	38.2%	48.7%	22.5%	41.8%
% do not know	21.7%	41.2%	17.6%	38.1%	15.6%	36.4%	22.8%	42.0%	26.5%	44.2%
Question 3										
% correct	6.9%	25.4%	10.6%	30.9%	13.5%	34.3%	3.7%	18.9%	4.5%	20.7%
% do not know	9.2%	28.9%	7.0%	25.6%	7.2%	25.9%	9.0%	28.7%	12.0%	32.6%
Average self-assessed financial knowledge (1–7, excludes other responses)	4.88	1.34	5.48	1.06	5.24	1.18	4.45	1.25	4.62	1.51
Number of observations										
Weighted share of sample	100%		26.6%		11.8%		31.4%		30.2%	
Unweighted	1,000		292		130		305		273	

This table reports statistics on the demographic and debt literacy variables for the total sample as well as for the four clusters defined in Table 3.

With respect to demographics, the payers in full have the highest income (43% have income over $75,000) and wealth (74% have financial assets in excess of $50,000). They are more likely to be married and to be white than are members of the other three clusters. Borrowers/savers have incomes almost as high as the pay in full group, similar levels of marriage, are the second-oldest group, and tend to be men (62%). In terms of wealth, this group is not quite as wealthy as the payers in full, with only 52% having financial assets above $50,000. The AFS users have the lowest income (53% have income below $30,000) and are most likely to be women (58%) and to be single or separated (47%). Finally, the fee payers look most like the 'average' American, with income distributed roughly similarly as in the overall sample, and other demographics (age, gender, marital status, and race) roughly comparable to the entire sample. Both the AFS users and the fee payers have considerably fewer financial assets than do the other two groups, with only 24% and 28%, respectively, having financial assets in excess of $50,000.

With respect to debt literacy (panel B), the payers in full and borrowers/savers are both more knowledgeable than the other two segments, scoring a considerably larger fraction of correct answers on the three questions than the latter two groups. The fee payers and AFS users are more likely to admit to not knowing the answers to the debt literacy questions. These patterns are also reflected in measures of self-reported financial knowledge; the fee payers and AFS users judge themselves to be much less knowledgeable than do payers in full and borrowers/savers. We can see this both in the average scores as well as in the distribution of scores. Whereas 48% and 53% of the payers in full and borrowers/savers ranked themselves in the top two scores with respect to their financial knowledge, for fee payers and AFS users, these comparable figures are 15.3% and 23.5%, respectively. In short, from the univariate statistics, the two clusters that pay the highest credit card fees and access the highest cost borrowing methods tend to have lower levels of debt literacy.

Of course, these univariate measures are correlated, and therefore we must consider all of the demographic variables simultaneously by using a multivariate approach to tease out the marginal relationship between debt literacy and behavior. The dependent variable in our analysis is an indicator for the four clusters we have identified in the data, and we use a multinomial logit analysis.

We have four correlated measures of debt literacy: the self-reported measure of financial knowledge and objective measures of debt literacy resulting from the answers to the three questions discussed above. The answers to the latter questions can be more finely characterized. For example, respondents with incorrect answers to the question about interest compounding are divided into two groups: those who underestimated and those who overestimated how quickly debt can double. Moreover, we add a dummy for those who did not know the answer to this question as this is a sizable and also distinct group of respondents (see Lusardi and Mitchell, 2014, for a detailed discussion of the 'do not know' responses). We also include a dummy for those who refused to answer the questions.[13]

[13] This is a small but rather heterogeneous group of respondents. For some of the debt literacy questions, there is a high prevalence of African-Americans who refused to answer.

All incorrect responses to the second literacy question were underestimates of how many years it would take to eliminate credit card debt. We aggregate the responses into those who made large underestimates (answered that it would take less than 5 years and between 5 and 10 years to eliminate credit card debt) versus those who chose a longer yet still incorrect time period (between 10 and 15 years). The incorrect answers to the third question characterize two distinct types of respondents. We keep these two groups separate. We again add dummies for those who did not know the answer or refused to answer.

Among the demographic variables, we include age and age squared and dummies for gender, race, and marital status. We add dummies for larger household sizes, characterizing those with four members and five or more members, and a dummy for those who are not employed; these families may be more vulnerable to shocks. Finally, we add dummies for household income and wealth. To consider how these demographic variables explain the four clusters, we conduct a multinomial logit regression across the four clusters considering the demographic variables and the debt literacy and self-assessed financial knowledge variables.

Table 5 reports the marginal effect of each variable in the multinomial logit regressions across the four clusters. For brevity, we report the estimates of the debt literacy variables only but we comment on the estimates of the demographic variables when appropriate.[14] Moreover, rather than reporting the estimates with respect to a reference group, we calculate the marginal effects in comparison to all the other clusters. We first consider the self-reported measure of financial knowledge (Table 5, first set of estimates). Even after accounting for demographics, those who display higher levels of financial knowledge are more likely to locate in cluster 1 (pay in full). Levels of self-assessed financial knowledge above the mean score (score of higher than 4) are associated with higher chances of being among those who pay in full, and the likelihood of being in this group is the greatest for those with high self-assessed knowledge (scores of 6 and 7). Individuals in this cluster are also those with high incomes (income greater than $75,000) and high wealth. African-Americans and Hispanics and those with large families are less likely to be in the pay in full group.

Self-reported financial knowledge is not related to the behavior of those in cluster 2, the borrowers/savers.[15] These individuals have relatively high income, and they do not display characteristics that are usually associated with debt problems (e.g., large families, unemployed, or divorced or separated). Income and race are the only variables that characterize those in cluster 2. While borrowers/savers do carry credit card balances and tend to pay finance charges, this behavior seems less likely to be due to lack of knowledge.

Those in cluster 3, the fee payers, are considerably less likely to report high levels of financial knowledge, even after controlling for many demographic traits. These

[14] The full set of estimates is available from the authors upon request. They were reported in an earlier version of this paper, see Lusardi and Tufano (2009).

[15] Note that this finding goes against the argument of 'learning by experience.' Respondents in cluster 2 have the highest experience with saving and borrowing. They own the highest percentage of assets and have used borrowing the most. Nevertheless they carry balances on their credit cards and pay fees and finance charges.

Table 5. *Multinomial logit analyses of characteristics of financial experience segments*

	Self-assessed financial knowledge				First measure of debt literacy				Second measure of debt literacy				Third measure of debt literacy			
Variables	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Lit1 (see definition below)	0.0775 (0.082)	0.0662 (0.060)	−0.0758 (0.055)	−0.0679 (0.059)	0.00229 (0.055)	−0.00213 (0.036)	−0.0519 (0.057)	0.0518 (0.065)	0.00753 (0.046)	−0.0219 (0.027)	−0.0989* (0.045)	0.113* (0.056)	−0.141* (0.055)	−0.0771* (0.032)	0.170* (0.082)	0.0481 (0.080)
Lit2 (see definition below)	0.215** (0.077)	0.0543 (0.049)	−0.131** (0.050)	−0.138** (0.053)	−0.0671* (0.033)	−0.0279 (0.022)	−0.0296 (0.040)	0.125** (0.044)	−0.0742* (0.036)	−0.0439* (0.021)	−0.0603 (0.043)	0.178** (0.051)	−0.0911*** (0.055)	−0.0768* (0.031)	0.137*** (0.083)	0.0306 (0.081)
Lit3 (see definition below)	0.313** (0.090)	0.0959 (0.064)	−0.254** (0.043)	−0.155** (0.055)	−0.137** (0.034)	−0.0590* (0.024)	0.0864*** (0.050)	0.110* (0.053)	−0.0852* (0.037)	−0.0533* (0.023)	−0.0374 (0.044)	0.176** (0.050)	−0.136** (0.048)	−0.0686** (0.026)	0.109 (0.110)	0.0965 (0.100)
Lit4 (see definition below)	0.294** (0.100)	0.0735 (0.070)	−0.275** (0.040)	−0.0925 (0.068)	−0.0833 (0.058)	−0.0887** (0.025)	−0.173** (0.066)	0.345** (0.084)	−0.126** (0.045)	−0.0903** (0.021)	−0.152* (0.063)	0.368** (0.077)	−0.142** (0.050)	−0.101** (0.018)	−0.072 (0.110)	0.315** (0.120)
Demographic controls: yes																
Number of observations	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Pseudo *R*-squared	0.177	0.177	0.177	0.177	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.160	0.160	0.160	0.160

This table reports the logit estimates belonging to one of four clusters on a set of debt literacy measures and demographic variables (marginal effects are reported). See text for detail.
Definitions of Lit1–Lit4 variables:
Self-assessed financial knowledge: Lit1 = 4, Lit2 = 5, Lit3 = 6, Lit4 = 7. Omitted class: low financial knowledge 1–3.
First measure of debt literacy: Lit1 = underestimate, Lit2 = overestimate, Lit3 = do not know, Lit4 = refuse to answer. Omitted class: Correct.
Second measure of debt literacy: Lit1 = underestimate, Lit2 = overestimate, Lit3 = do not know, Lit4 = refuse to answer. Omitted class: Correct.
Third measure of debt literacy: Lit1 = option a, Lit2 = same, Lit3 = do not know, Lit4 = refuse to answer. Omitted class: Correct.
*p < 0.05; **p < 0.01; ***p < 0.1.
Standard errors in parentheses.

respondents are also more likely to have lower levels of wealth, to be African-American, and to have large families.

Low levels of financial knowledge also characterize AFS users in cluster 4. These respondents are much less likely to report high levels of financial knowledge and more likely to be unemployed or to have lower incomes (income less than $30,000).

We find similar patterns when we use the three measures of debt literacy instead of the self-reported measure of financial knowledge (Table 5, last three sets of estimates). Those who overestimated how long it takes for debt to double may be lulled into borrowing more or not paying on time. Indeed, those who are less likely to be knowledgeable about interest compounding, both because they overestimated the number of years it takes for debt to double or because they did not know the answer to this question, are less likely to belong to the pay in full group and more likely to belong to the AFS users group. Being unable to answer the question about interest compounding also characterizes those who belong to cluster 3, the pay fees segment, who tend to carry balances and pay finance charges and penalty fees. On the other hand, those who did not know the answer to the question about interest compounding are less likely to belong to cluster 2, the borrowers/savers, who are likely to carry balances and not pay on time.

Turning to the second measure of debt literacy, we find that those who make mistakes, both small and large, in answering this question are significantly more likely to belong to the AFS users group. Those who display the lowest level of debt literacy, i.e., responded that they do not know the answer to this question, are also more likely to belong to this group. Conversely, those who made small mistakes or did not know the answer to the question are *less* likely to belong to the pay in full or borrowers/savers clusters.

Estimates for the third debt literacy question – which may also capture a behavioral bias – show similar findings: those who answered this question 'incorrectly' (i.e., chose option (a) or thought the two options were the same or ignored the time value of money) or did not know the answer to the question are much less likely to belong to the pay in full group or the borrower/saver group – and are more likely to belong to the pay fees cluster.[16]

In summary, for each measure of debt literacy, there is a strong relationship between debt literacy and debt behavior, even after controlling for demographics. The more financially knowledgeable, who grasp basic concepts about debt, are much more likely to pay their credit cards in full, while those who are less debt literate are more likely to pay fees or be AFS users. Our borrowers/savers are rather knowledgeable and have high incomes, yet tend to carry credit card balances and pay finance charges, perhaps because these charges are not particularly consequential for this group. In the next section, we try to address this issue by examining self-reported debt loads. Before we do so, we should mention that, while we find a strong link between debt literacy and debt behavior, we cannot say whether it is a causal one. It is possible that behavior toward debt also has an effect on debt literacy, though one

[16] If debt literacy is measured with error and the errors are random (the classical measurement error problem), then our estimates of debt literacy underestimate the true effect.

may have to explain why behavior toward debt is responsible for some of the nuances of the debt literacy variables (e.g., overestimating rather than underestimating the effect of compound interest). Also, there could be unobservables driving both debt literacy and debt behavior that we are not able to account for in cross-sectional data. Moreover, debt literacy may be measured with considerable error. These are topics for future work, but we note that in all of the estimates that try to account for these problems (measurement error and/or endogeneity), the effect of financial literacy is always found to be bigger than reported in the simple Ordinary Least Squares (OLS) estimates (see Lusardi and Mitchell, 2014); thus our estimates may even underestimate the true effect of debt literacy.

5 Overindebtedness

According to intertemporal economic models, consumers borrow to smooth consumption over the life cycle. Variations in debt over time and across individuals would not necessarily indicate that anyone felt 'over-levered' or 'under-levered.' Yet imperfections in financial markets and shocks might lead individuals to conclude that their debt level was suboptimal. Some may suffer from credit constraints and be unable to borrow as much as they would like. Others may be hit by unexpected negative shocks and carry higher debt loads than they might otherwise prefer. The existing literature has largely failed to consider that some may accumulate too much debt by being unaware of the consequences of their own choices. We consider the latter possibility, looking for links between debt levels and lack of financial knowledge.

In the survey, we sought to understand whether people have difficulties paying off their debt. While we recognize the potential problems with self-reported measures of debt levels, these reports give information about credit constraints and consumers' interest in additional borrowing. To gauge debt levels, we asked individuals the following question:

Which of the following best describes your current debt position?

a. I have too much debt right now and I have or may have difficulty paying it off.
b. I have about the right amount of debt right now and I face no problems with it.
c. I have too little debt right now, I wish I could get more.
d. I just do not know.

In aggregate, in November 2007, before the financial crisis hit the economy, 26.4% of respondents in our representative sample of Americans already said they have or may have difficulty paying off debt (*have difficulty with debt*). Another group, 11.1%, 'just did not know' their debt position (*unsure*). We focus primarily on these two groups.

Paralleling our analysis in the last section, we first report on the traits of these different groups in univariate terms and then provide a multinomial logit analysis of debt loads. Table 6 shows that relative to those who are comfortable with their level of debt, those experiencing difficulty with debt are younger and have fewer financial assets and lower incomes. Note that they are disproportionately drawn from the

Table 6. *Characteristics by self-assessed debt levels*

			Indebtedness self-assessment							
	Total sample		Have difficulty with debt		Right amount		Too little		Just do not know	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Panel A: demographics	47.8	14.4	44.1	12.7	49.8	14.5	43.7	16.9	46.6	15.8
Age										
Female	50.0%	50.0%	48.4%	50.1%	47.7%	50.0%	30.7%	47.3%	69.5%	46.3%
White	85.0%	35.7%	84.9%	35.9%	87.0%	33.7%	87.9%	33.4%	74.1%	44.0%
Black	6.4%	24.6%	6.9%	25.4%	4.4%	20.4%	0.0%	0.0%	17.9%	38.5%
Hispanic	3.6%	18.7%	4.1%	19.8%	3.4%	18.1%	6.1%	24.6%	3.5%	18.5%
Married	64.0%	48.0%	62.5%	48.5%	69.2%	46.2%	59.6%	50.4%	40.0%	49.2%
Single	16.0%	36.7%	16.1%	36.8%	12.8%	33.5%	33.6%	48.4%	30.3%	46.2%
Separated	19.9%	40.0%	21.4%	41.1%	17.9%	38.4%	6.9%	26.0%	29.7%	45.9%
Household income:										
Under $30,000	32.8%	47.0%	41.0%	49.3%	24.2%	42.9%	38.0%	49.8%	59.3%	49.4%
$30,000–$49,999	20.4%	40.3%	21.1%	40.9%	19.9%	39.9%	13.7%	35.2%	23.1%	42.3%
$50,000–$74,999	18.2%	38.6%	18.3%	38.8%	20.4%	40.3%	15.0%	36.6%	6.5%	24.8%
Above $75,000	28.5%	45.2%	19.5%	39.7%	35.5%	47.9%	33.4%	48.4%	11.1%	31.6%
Not employed	13.9%	34.6%	15.6%	36.3%	12.4%	33.0%	17.0%	38.5%	17.7%	38.4%
Financial assets:										
Under $50,000	58.2%	49.3%	82.7%	37.9%	46.5%	49.9%	30.2%	47.1%	68.8%	46.6%
$50–$100,000	13.1%	33.8%	10.0%	30.0%	14.5%	35.2%	8.5%	28.7%	13.7%	34.6%
$100–$250,000	11.6%	32.0%	4.5%	20.7%	15.8%	36.5%	26.8%	45.5%	2.7%	16.2%
Over $250,000	17.1%	37.7%	2.9%	16.8%	23.2%	42.2%	34.3%	45.7%	14.8%	35.7%
Panel B: debt literacy										
Question 1										
% correct	35.9%	48.0%	32.1%	46.8%	41.7%	49.3%	30.8%	47.3%	14.2%	35.1%
% do not know	18.3%	38.7%	19.1%	39.4%	15.5%	36.2%	37.7%	49.7%	28.4%	45.3%

Question 2										
% correct	35.4%	47.8%	38.2%	48.7%	38.0%	48.6%	16.2%	37.8%	18.0%	38.6%
% do not know	21.7%	41.2%	21.6%	41.3%	19.5%	39.7%	37.7%	49.7%	30.9%	46.4%
Question 3										
% correct	6.9%	25.4%	6.0%	23.8%	8.3%	27.6%	8.1%	28.0%	1.7%	12.9%
% do not know	9.2%	28.9%	8.0%	27.2%	7.9%	27.0%	6.1%	24.6%	19.1%	39.5%
Average self-assessed financial knowledge (1–7, excludes other responses)	4.88	1.34	4.34	1.41	5.16	1.17	6.17	1.17	4.41	1.58
Panel C: experience clusters										
1: Pay in full	26.6%	44.2%	2.6%	16.1%	38.1%	48.6%	62.4%	49.7%	14.4%	35.3%
2: Borrowers/savers	11.9%	32.3%	15.4%	36.1%	11.7%	32.1%	0.0%	0.0%	6.6%	25.0%
3: Pay fees	31.4%	46.4%	53.3%	50.0%	25.1%	43.4%	0.0%	0.0%	18.8%	39.3%
4: AFS users	30.2%	45.9%	28.7%	45.3%	25.1%	43.4%	37.6%	49.7%	60.2%	49.2%
Number of observations										
Weighted share of sample	100%		26.4%		60.5%		20.0%		11.1%	
Unweighted	1000		248		634		20		98	

This table reports statistics on the demographic, debt literacy, and experience segmentation variables for the total sample as well as for the four groups defined by their self-assessed level of indebtedness.

pay fees cluster, while almost none are part of the pay in full segment. In terms of debt literacy, they rank themselves the lowest.

The 'unsure,' the 11% who were unable to judge whether they have too much or too little debt (they answered they just did not know), tend to be disproportionately female (nearly 70%), African-American (18%), and unmarried (60%): the same characteristics displayed by those with low debt literacy. With respect to income, they are disproportionately drawn from the lowest income group (59% with household income under $30,000 per year), and have considerably less wealth than the 60% who categorized their debt load as 'about right.' Their debt literacy is considerably weaker than that of respondents who judged their debt to be either about right or have difficulty with debt. Respondents in this group were also more likely to select 'do not know' as the answer to the debt literacy questions. This group is disproportionately drawn from the AFS users segment.

We perform a multinomial logit analysis of the three groups mentioned above: those having difficulty with debt, the unsure, and those with the right amount of debt. As predictors for these debt outcomes, we add dummies for the different measures of debt literacy (Table 7). Moreover, we use demographic variables, including age and age squared, and dummies for gender, marital status, race, family size, employment status, and income and wealth.[17]

Self-reported financial knowledge is strongly correlated to self-assessed debt burdens. Those who reported higher levels of financial knowledge are more likely to belong to the group who reported having no difficulty handling their current debt. The effect is not only sizable but it tends to increase with higher scores for self-assessed knowledge. Conversely, those with lower self-reported financial knowledge are much more likely to have reported having difficulty with debt, and again there is a monotonic (negative) relationship between financial knowledge and having too much debt. Although the estimates are less sizable than for those who have or may have difficulty with debt, those who just do not know their current debt position are also much less likely to display high levels of self-assessed financial knowledge (Table 7). Moreover, those who are employed and have higher income and higher wealth are much more likely to have reported that they have the right amount of debt. Finally, women, African-Americans, and those with low income and wealth are less able to judge their debt load.

When we consider the measures of debt literacy, we find similar results. Most importantly, these results are consistent with the multinomial logit for the experience segments. Specifically, those who overestimated the number of years it takes for debt to double (first measure of debt literacy) are also more likely to have reported that they have or may have difficulty paying off debt. On the other hand, those who made mistakes in answering this question or did not know the answer to this question are much less likely to have reported that they have the right amount of debt; they are more likely to belong to the unsure (just do not know) group.

Knowledge about how to eliminate credit card debt (second debt literacy question) is also related to self-assessed levels of debt. Those who display the least knowledge,

[17] For brevity, the estimates of these demographic variables are not reported.

Table 7. *Multinomial logit analyses of self-assessed debt levels*

	Self-assessed financial knowledge			First measure of debt literacy			Second measure of debt literacy			Third measure of debt literacy		
Variables	Have difficulty with debt	Just right	Just do not know	Have difficulty with debt	Just right	Just do not know	Have difficulty with debt	Just right	Just do not know	Have difficulty with debt	Just right	Just do not know
Lit1	−0.107*	0.145*	−0.0375**	0.0149	−0.132**	0.117**	−0.039	−0.0347	0.0737**	0.0285	−0.115	0.0865
(see definition below)	(0.037)	(0.044)	(0.019)	(0.053)	(0.066)	(0.057)	(0.039)	(0.051)	(0.037)	(0.062)	(0.079)	(0.071)
Lit2	−0.135*	0.225*	−0.0902*	0.0791**	−0.127*	0.0478	−0.00288	0.0135	−0.0106	−0.0235	−0.0464	0.0699
(see definition below)	(0.037)	(0.042)	(0.021)	(0.037)	(0.042)	(0.029)	(0.038)	(0.043)	(0.026)	(0.060)	(0.079)	(0.070)
Lit3	−0.171*	0.228*	−0.0574*	0.0434	−0.173*	0.130*	−0.0115	−0.0788***	0.0903**	−0.0559	−0.233***	0.288***
(see definition below)	(0.033)	(0.039)	(0.018)	(0.045)	(0.054)	(0.046)	(0.038)	(0.047)	(0.036)	(0.072)	(0.140)	(0.170)
Lit4	−0.182*	0.217*	−0.0343	−0.162*	−0.197***	0.358*	−0.107***	−0.146	0.252*	−0.130**	−0.235	0.365***
(see definition below)	(0.031)	(0.039)	(0.022)	(0.048)	(0.100)	(0.100)	(0.055)	(0.091)	(0.088)	(0.064)	(0.170)	(0.200)
Demographic controls: yes												
Number of observations	980	980	980	980	980	980	980	980	980	980	980	980
Pseudo *R*-squared	0.189	0.189	0.189	0.170	0.170	0.170	0.164	0.164	0.164	0.163	0.163	0.163

This table reports the logit estimates of belonging to a specific debt group on a set of debt literacy measures and demographic variables (marginal effects are reported). See text for detail.
Definitions of Lit1–Lit4 variables:
Self-assessed financial knowledge: Lit1 = 4, Lit2 = 5, Lit3 = 6, Lit4 = 7. Omitted class: low financial knowledge 1–3.
First measure of debt literacy: Lit1 = underestimate, Lit2 = overestimate, Lit3 = do not know, Lit4 = refuse to answer. Omitted class: Correct.
Second measure of debt literacy: Lit1 = underestimate, Lit2 = overestimate, Lit3 = do not know, Lit4 = refuse to answer. Omitted class: Correct.
Third measure of debt literacy: Lit1 = option a, Lit2 = same, Lit3 = do not know, Lit4 = refuse to answer. Omitted class: Correct.
*p < 0.01; **p < 0.05; ***p < 0.1.
Standard errors in parentheses.

i.e., claimed not to know the answer to this question, are less likely to have reported having the right amount of debt. Those respondents who were not able to answer the third debt literacy question (installment versus single future payments) are less likely to have reported having the right amount of debt; they are more likely to belong to the unsure group. There seems to be a group of individuals unsure of their financial skills *and* of their debt loads.

For completeness, we also examine the estimates in which we account for the three dummies characterizing different clusters (the first cluster is the reference group). In this way, we can assess whether financial experiences have a direct effect on the amount of debt that respondents have and whether the effect of debt literacy remains significant after accounting for the behavior characterized by the four clusters. The effect of debt literacy weakens only for the third measure of debt literacy; otherwise, there is still an effect even after accounting for the clusters. Thus, debt literacy is related to debt loads above and beyond the effect it has on financial experiences. Moreover, even after accounting for a large set of demographic characteristics, those who belong to the three segments that do not pay credit cards in full are disproportionately more likely to have difficulty with debt. Similarly, members of clusters 2, 3, and 4 are much less likely to have reported that they have the right amount of debt. Note that not just the fee payers and the AFS users reported having difficulty with debt, but those in cluster 2, who carry some balances and pay some finance charges, also end up with too much debt.[18]

6 An estimate of the cost of ignorance

In this section, we offer partial estimates of what we call 'the cost of ignorance,' or the financial transaction costs incurred by less-informed Americans and the component of these costs that is particularly related to lack of financial knowledge. For the purpose of this calculation, we focus exclusively on credit card debt.

This calculation of expected costs has two components – the likelihood of and the costs of various behaviors. First, we calculate the *likelihood* of engaging in four credit card behaviors that give rise to explicit fees or finance charges: paying bills late, going over the credit limit, using cash advances, and paying the minimum amount only. These likelihoods come directly from empirical estimates using the data on credit card behavior, debt literacy, and demographics. We compare consumers with higher versus lower financial knowledge, with the least financially savvy in our population defined as those who judge their financial knowledge equal to 4 or lower on our seven-point scale.

The second part of the calculation estimates the *costs* incurred by the cardholder, conditional on engaging in the particular behavior. For the purpose of this calculation, we use estimated credit card balances across higher versus lower financial knowledge individuals.

As described in more detail in the appendix and Appendix Table A2, these four behaviors give rise to collective fees and charges of $39.3 billion paid by cardholders,

[18] For brevity, estimates are not reported but are available from the authors upon request.

most of which are finance charges due to paying only the minimum amount due. The less knowledgeable account for 28.7% of the cardholder population and account for 21% of these charges, because of their higher likelihood of incurring them but a lower balance on their credit cards. Thus, they bear a sizable share of the fees associated with fee-inducing behaviors. Perhaps more importantly, of these four types of charges incurred by less-knowledgeable cardholders, one-third are incremental charges that are empirically linked to low financial knowledge after controlling for many variables, including income, age, family structure, wealth, and other demographic factors. Even in these very conservative calculations, the cost of ignorance is significant.

7 Moving forward

This paper has circulated extensively prior to its publication, and a number of studies have used the questions we designed for this survey and have found very similar results. For example, Gathergood (2012) and Disney and Gathergood (2013) used a set of questions very similar to our 'debt literacy' measures to study consumer overindebtedness and borrowing in the UK. As in the US, consumers in the UK have low debt literacy and are not familiar with the concepts related to debt. Importantly, these authors also find a strong link between low debt literacy and both overindebtedness and high-cost consumer borrowing. Interestingly, their data show that low debt literacy is also associated with finding financial services complicated or confusing.

Some of the questions designed for this survey were also added to the National Financial Capability Survey (NFCS), in both the 2009 and 2012 waves; the 2015 wave of the NFCS will have not only the set of questions measuring financial experiences and overindebtedness but also a question about debt literacy. De Bassa Scheresberg and Lusardi (2013) examine data from the first wave of the NFCS, using the questions on high-cost methods of borrowing that were taken from the TNS survey (payday lons, pawn shops, auto title loans, tax refund loans, and rent-to-own shops). Similar to the findings in our work, they show that those with lower financial literacy are more likely to borrow at high costs. De Bassa Scheresberg (2013) examines high-cost methods of borrowing among the young and shows there is a sharp divide in the use of these methods of borrowing among education groups; it is those with low educational attainment who disproportionately use high-cost methods of borrowing. However, he shows that financial literacy also matters; those who have low financial literacy are more likely to borrow at high costs, even after accounting for the effect of education.

In the wake of the financial crisis, academic attention has turned to debt, how individuals manage debt, and the importance of financial skills. Gerardi *et al*. (2013) show that numerical ability (assessed with a combination of questions measuring financial literacy and knowledge of math) has contributed substantially to the massive number of defaults on subprime mortgages in the recent financial crisis. According to their estimates, those in the highest numerical ability group have a much lower probability of defaulting on their subprime mortgages than those in the lowest financial numeracy group, and this alone can explain a large part of the chance of defaulting. Similarly,

Agarwal and Mazumder (2013) examine two suboptimal behaviors related to borrowing, with the first case featuring the use of credit cards for convenience transaction after a balance transfer and the second involving a financial mistake on a home equity loan application. They find that consumers with higher math scores (as measured by the Armed Forces Qualifying Test) are substantially less likely to make a financial mistake. Agarwal *et al*. (2009) also focused on financial 'mistakes' related to decisions about debt, showing not only that they are consequential in terms of costs associated with them, but also that they are most prevalent among the young and the old, which our data show are the age groups with the lowest levels of debt literacy.

Other papers have pointed to the relationship between self-control problems and debt, which could help us interpret the evidence from one of our three debt literacy questions. For example, Meier and Sprenger (2010) show that present-biased individuals are more likely to have credit card debt and to have significantly higher amounts of credit card debt. Similarly, McCarthy (2011) shows that self-control is an important predictor of financial distress (keeping up with bills and credit commitments).

Given the extent to which debt has become a persistent feature of household balance sheets at every stage of life, including close to retirement (Lusardi and Mitchell, 2013) or at the start the economic life, due to the growing size of student loans or other loans, we think it is more important than ever before to pay attention to how individuals manage indebtedness.

With consumer credit becoming so widely available and accessed among households, one may argue about the possibility of societal or peer pressure regarding debt. For example, are people who perceive themselves poorer than their social circles more likely to borrow to keep up with peers, and can these types of borrowing contribute to potential financial distress? These are the questions that a recent paper investigates (Georgarakos *et al*., 2014). The study shows that such pressure exists; those who perceive others as having higher average incomes consume more (trying to emulate the peer spending) and also borrow more, potentially increasing their financial distress in the future. Thus, more than ever, debt behavior and over-indebtedness are important topics to study.

8 Implications and conclusions

With this work, we focus attention on an important component of financial literacy – debt literacy. Moreover, we consider individuals' rich set of financial experiences, rather than simply focusing on one behavior. We also take into account individuals' assessments of their own debt levels. Finally, we design a project that blends scholarly research with market research. Our conclusions suggest a complex set of interactions among debt literacy, financial experiences, demographics, and debt loads.

Low levels of debt literacy are the norm, and understanding of the basic mechanics of debt is especially limited among the elderly, women, certain minorities, and people with lower incomes and wealth. Particularly intriguing is the notion that certain respondent groups, like the elderly, *think* they know considerably more than they actually do. This disparity may help explain the incidence of financial frauds perpetrated

against the elderly. Moreover, women – both young and old – exhibit substantially lower debt literacy than men.

Second, people have rich sets of financial experiences. Our work collapses these experiences into four segments and shows that the segments are closely linked with both demographics and debt literacy. It is troubling that the people whose financial transaction patterns are characterized by high-cost borrowing are those who come from vulnerable demographic groups and – even after controlling for these factors – are less debt literate. People who make financial choices that incur high fees and charges (e.g., only paying the minimum balance on credit cards, incurring late or over-the-limit fees, using alternative financial service credit such as payday loans, tax refund loans, or pawnshops) are those with a weaker understanding of the implications of debt. Finally, in November 2007, over a quarter of Americans felt overburdened with respect to their debt loads and another 11% were unable to assess their debt position. Thus, even before the onset of the financial crisis, more than 40% of families had issues with their debt position. Moreover, those facing difficulty paying off debt were drawn from certain demographic groups, had common financial experiences characterized by costly borrowing, and tended to have lower levels of debt literacy.

Our empirical results suggest a sizeable cost of financial ignorance as well. Using credit cards as an example, we find that the less financially knowledgeable pay a sizeable fraction of fees and finance charges. Our empirical analysis suggests that about a third of the fees and charges paid by low financial knowledge individuals are related to lack of knowledge, even after controlling for observable differences in income, wealth, family status, and other factors.

We think there are a number of implications from our findings. If poor financial decisions partly result from lack of financial knowledge, then in certain circumstances, one may be able to design mechanisms to compensate for it. These solutions might be embodied in auto enrollment options, such as those studied by Choi *et al.* (2003, 2004*a*) and Choi *et al.* (2004*b*), among others. However, once one recognizes the wide range of financial choices that consumers potentially face, it becomes harder to conceive that poor financial decisions can be overcome in this fashion. For example, someone who needs additional funds will have to search for and compare alternatives ranging from extending their borrowing on their credit cards to taking out a home equity loan to overdrafting a bank account to taking out a payday loan to borrowing from a friend or going to a pawn shop. As much as we could try to circumscribe the choices, individuals will need to make active decisions. Our work suggests that financial literacy is related to the choices that people make, with less knowledgeable people making more costly decisions – even after controlling for a host of other factors. We interpret this to mean that additional research on financial literacy – and education to enhance financial literacy – remains an important priority, especially to understand the debt-related choices that consumers make.

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Appendix

Description of the survey

The survey was fielded in November 2007 by the staff of TNS Global. TNS is the largest custom market research provider in the US. It is a leader in opinion polling and political and social research. It has offices in more than 80 countries across the Americas, Africa, Asia Pacific, Europe, and the Middle East.[19]

The data were collected via a phone interview from a sample of 1,000 US respondents. Weights were constructed to make the final sample representative of the US population with respect to income, gender, age, and other observable traits such as household size, region, and market size. The survey reports information on several demographic characteristics, such as age, gender, race and ethnicity, marital status, employment, region of residence, family type, and family size. In addition, it provides self-reported information on family income and wealth. Respondents identified their household income category (one of four options) and the category into which their

[19] See http://www.tnsglobal.com/.

total *investable* assets fall (ten brackets are provided). Total investable assets include any sums in cash, checking or savings accounts, stocks, bonds, mutual funds, insurance policies, and any money in IRAs. Respondents are asked to exclude primary residence, real estate, closely held businesses or assets in any employer-sponsored savings or retirement plans, including a 401(k) plan, from their measure of investable assets.

Cluster analysis

A number of studies look at single activities, intensively studying consumers who use payday lending, refund anticipation lending, or credit cards. But these single-dimensional characterizations of consumer behavior cannot capture the fact that consumers engage in many activities simultaneously. Focusing on one transaction only gives a narrow view of individuals' borrowing and saving behavior. While it is possible to analyze each type of experience in Appendix Table A1 one at a time, or to consider dyads or triads of behaviors, the large matrix contains a set of correlated activities.

To reduce the dimensionality of this matrix, we rely on techniques used in marketing and market research. In particular, we use cluster analysis, a technique related to principal components analysis or factor analysis to reduce the dimensionality of a rich data set. In this case, the cluster analysis is used to determine which groups of individuals have had similar financial experiences or could be considered 'market segments.' This segmentation is carried out solely on the basis of transaction activity, without referring to demographics, literacy, or self-judged indebtedness.

Cluster analysis is used commonly in biology, linguistics, and marketing. It is used to segment a heterogeneous population into groups that are more homogeneous. Essentially, it parses the data into groups, testing for differences among groups as it divides the data into two, three, four, or more groups.[20] For our purposes, a key analytic question was which transaction types to include in the analysis. We include *all* of the transaction activity listed above in defining the cluster. The procedure groups the data into any arbitrary number of clusters. One must use statistics, judgment, and sensitivity testing to ensure that the clustering is correct and sensible.[21]

[20] Cluster analysis is related to factor analysis; the latter identifies common traits and the former identifies similar populations of individuals on the basis of underlying factors.

[21] We used Ward's linkage method (Ward, 1963), which is an agglomerative, hierarchical clustering method, as implemented in Stata, to perform the cluster analysis. The procedure works as follows: The N observations in the sample start out as N separate groups each of size one. The two closest observations are merged into one group, producing N-1 total groups. This process continues until all of the observations are merged into one large group. This produces a hierarchy of groupings from one group to N groups. The definition of "closest two groups" is based on minimizing the sum of squared errors. In order to select an optimal number of clusters, we relied on both statistical criteria and inspection of the clustering results. Our statistical criteria were the Calinski/Harabasz pseudo-F index, and the Duda/Hart index. These results suggested that we use three, four, or five clusters. We then analyzed the outputs for each of these possible numbers of clusters, for instance by examining the means and standard deviations of the variables in each cluster. We chose to use four clusters because using five clusters yielded some individual groups that were rather small for proper analysis, and using three clusters resulted in groups that were still quite heterogeneous.

Table A1. *Conditional financial experience measures, total sample*

		Conditioning financial experience																					
	Unconditional probability (%)	CC: None	CC: Balance	CC: Min Pay	CC: Late	CC: OTL	CC: Cash Advance	CC: Closed	CC: PIF	Checking	Savings/CD	Mutual fund	Stocks	Bonds	Loan: Student	Loan: Auto	Loan: HE	Loan: Mortgage	Loan: Payday	Loan: Refund	Loan: Title	Pawn	Layaway/Rent
CC: None	37	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.15	0.06	0.06	0.09	0.17	0.14	0.09	0.10	0.40	0.34	0.20	0.44	0.34
CC: Balance	31	0.00	1.00	0.52	0.64	0.67	0.55	0.21	0.03	0.32	0.34	0.32	0.31	0.36	0.45	0.39	0.35	0.36	0.33	0.27	0.41	0.24	0.38
CC: Min Pay	21	0.00	0.36	1.00	0.63	0.60	0.59	0.22	0.02	0.22	0.21	0.17	0.16	0.16	0.29	0.23	0.21	0.21	0.30	0.31	0.24	0.30	0.32
CC: Late	8	0.00	0.16	0.23	1.00	0.60	0.25	0.31	0.02	0.08	0.08	0.06	0.06	0.05	0.12	0.08	0.05	0.06	0.12	0.14	0.09	0.08	0.10
CC: OTL	4	0.00	0.09	0.12	0.35	1.00	0.21	0.27	0.00	0.04	0.05	0.03	0.04	0.04	0.07	0.05	0.03	0.03	0.09	0.08	0.06	0.02	0.04
CC: Cash Advance	31	0.00	0.09	0.14	0.17	0.25	1.00	0.00	0.01	0.05	0.05	0.03	0.03	0.05	0.05	0.05	0.05	0.03	0.11	0.04	0.05	0.04	0.08
CC: Closed	2	0.00	0.01	0.02	0.06	0.09	0.00	1.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.02	0.03	0.00	0.03	0.01
CC: PIF	37	0.00	0.03	0.03	0.08	0.03	0.07	0.05	1.00	0.37	0.40	0.56	0.54	0.49	0.26	0.37	0.44	0.45	0.12	0.14	0.28	0.13	0.16
Checking	91	0.83	0.96	0.96	0.94	0.93	0.88	1.00	0.92	1.00	0.97	0.97	0.97	0.97	0.96	0.97	0.97	0.97	0.99	1.00	0.98	0.95	0.95
Savings/CD	81	0.59	0.89	0.81	0.83	0.93	0.78	0.67	0.89	0.85	1.00	0.95	0.96	0.96	0.88	0.90	0.91	0.92	0.82	0.79	0.96	0.74	0.83
Mutual fund	39	0.11	0.40	0.31	0.33	0.31	0.24	0.13	0.59	0.41	0.46	1.00	0.77	0.63	0.43	0.47	0.58	0.54	0.25	0.21	0.36	0.24	0.27
Stocks	34	0.10	0.34	0.26	0.29	0.28	0.19	0.13	0.50	0.36	0.41	0.67	1.00	0.58	0.37	0.42	0.52	0.49	0.26	0.33	0.33	0.30	0.26
Bonds	35	0.15	0.41	0.26	0.24	0.30	0.31	0.21	0.47	0.37	0.41	0.57	0.60	1.00	0.41	0.45	0.49	0.48	0.25	0.31	0.42	0.21	0.31
Loan: Student	27	0.22	0.39	0.37	0.41	0.44	0.28	0.13	0.19	0.28	0.30	0.30	0.30	0.32	1.00	0.34	0.35	0.32	0.36	0.41	0.37	0.28	0.33
Loan: Auto	64	0.44	0.80	0.71	0.71	0.79	0.59	0.38	0.64	0.68	0.71	0.78	0.78	0.82	0.81	1.00	0.87	0.85	0.75	0.73	0.85	0.62	0.71
Loan: HE	30	0.13	0.35	0.30	0.24	0.19	0.31	0.05	0.37	0.32	0.34	0.46	0.46	0.43	0.40	0.42	1.00	0.48	0.26	0.29	0.40	0.23	0.25
Loan: Mortgage	49	0.24	0.58	0.49	0.38	0.32	0.31	0.19	0.60	0.53	0.56	0.69	0.71	0.67	0.58	0.66	0.77	1.00	0.44	0.38	0.62	0.38	0.44

Table A1 (*cont.*)

		Conditioning financial experience																					
	Unconditional probability (%)	CC: None	CC: Balance	CC: Min Pay	CC: Late	CC: OTL	CC: Cash Advance	CC: Closed	CC: PIF	Checking	Savings/CD	Mutual fund	Stocks	Bonds	Loan: Student	Loan: Auto	Loan: HE	Loan: Mortgage	Loan: Payday	Loan: Refund	Loan: Title	Pawn	Layaway/Rent
Loan: Payday	8	0.15	0.08	0.11	0.12	0.16	0.16	0.13	0.03	0.08	0.08	0.05	0.06	0.05	0.10	0.09	0.07	0.07	1.00	0.59	0.20	0.37	0.19
Loan: Refund	4	0.07	0.04	0.06	0.08	0.07	0.03	0.08	0.02	0.05	0.04	0.02	0.04	0.04	0.07	0.05	0.05	0.03	0.33	1.00	0.15	0.22	0.13
Loan: Title	7	0.06	0.09	0.07	0.07	0.09	0.07	0.00	0.05	0.07	0.08	0.06	0.06	0.08	0.09	0.09	0.09	0.08	0.17	0.22	1.00	0.13	0.14
Pawn	39	0.23	0.08	0.15	0.12	0.05	0.07	0.21	0.04	0.11	0.10	0.07	0.09	0.06	0.11	0.10	0.08	0.08	0.51	0.53	0.21	1.00	0.30
Layaway/Rent	19	0.31	0.23	0.29	0.26	0.17	0.31	0.09	0.08	0.20	0.20	0.13	0.14	0.17	0.23	0.21	0.15	0.17	0.47	0.59	0.41	0.53	1.00

Each cell represents the fraction of individuals who have certain financial experiences, conditional on having experience with the activity listed at the top of the column. The first column reports the unconditional probabilities. The cells in gray represent the cases where conditional values exceed unconditional values of financial experiences. The survey of 1,000 people was conducted by TNS Global in November 2007.

Table A2. *Estimates of the 'cost of ignorance' for credit card holders*

Number of American adults[1]	227,713,184			
Fraction with credit cards[2]	79.4%			
Number of Americans with credit cards	180,758,725			
Unconditional likelihood of credit card behaviors	Incidence among credit card holders[3] (%)	Number of Americans	Fee or cost per incidence	Aggregate fee or cost
Incurring late fees	9.5	17,260,659.35	$35.00[4]	$604,123,077
Incurring over the limit fees	5.6	10,064,922.73	$35.00[5]	$352,272,296
Paying minimum only	26.8	48,457,365.56	$790.93[6]	$38,326,258,312
Use for cash advances	6.6	11,909,399.52	$5.00[7]	$59,546,998
			Total	$39,342,200,683
Fraction of cardholders who are less financial knowledgeable[8]	28.7			
Incremental likelihood by less financial knowledgeable[9]				
Incurring late fees	1.7	881,921.82	$35.00	$30,867,264
Incurring over the limit fees	1.5	778,166.31	$35.00	$27,235,821
Paying minimum only	12.7	6,588,474.78	$395.46	$2,605,502,627
Use for cash advances	3.4	1,763,843.64	$5.00	$8,819,218
			Total	$2,672,424,930
Total likelihood by less financial knowledgeable[10]				
Incurring late fees	11.2	5,835,731.05	$35.00	$204,250,587
Incurring over the limit fees	7.1	3,666,799.14	$35.00	$128,337,970
Paying minimum only	39.5	20,495,738.70	$395.46	$8,105,320,694
Use for cash advances	10.0	5,181,841.31	$5.00	$25,909,207
			Total	$8,463,818,458

Notes and Sources:
[1] US Census, 2007 American Community Survey.
[2] From TNS Survey.
[3] From TNS Survey, unconditional likelihoods divided by number of respondents with active credit cards.
[4] Assumes one incidence per year. Average fee taken from Green, Jeffrey, 'Exclusive Bank Card Profitability Study and Annual Report 2008,' *Cards and Payments*, May 2008.
[5] Assumes one incidence per year. Average fee taken from http://www.cardtrak.com/news/2008/12/17/fees_recession.
[6] One year of finance charges calculated using average revolver balance ($6,000) for total population and average revolver balance of $3,000 for low literacy individuals, and average APR for 2007 (14.53%), assuming no additional charges on card and payment of minimum balance (3%) per month. Average APR from Consumer Action's 2007 Credit Card Survey. http://www.consumer-action.org/downloads/english/CA_News_CC_07.pdf. Average balance estimated by authors based on numerous industry reports and surveys.
[7] 'Standard' cash advance fee is $5 or 3% of the amount taken out. GAO Report, Credit Cards, September 2006. http://www.gao.gov/new.items/d06929.pdf. Assumes one cash advance per year.
[8] Fraction of respondents who are active credit card holders and who chose 4 or lower on self-assessment of financial knowledge.
[9] dprobit coefficients, reflecting incremental probability of these behaviors associated with low financial knowledge (self-assessment of 4 or less). Each individual behavior was analyzed using a set of regressors including age, gender, race, marital status, household size, employment status, and income and wealth dummies.
[10] Calculated from the unconditional probabilities of behavior, the incremental probability conditional on being less financially knowledgeable, and the probability of being less financially knowledgeable given in the table above.

The cost of ignorance: our calculations

This calculation of expected costs has two components – the likelihood of and the costs of various behaviors. First, we calculate the *likelihood* of engaging in various credit card behaviors that give rise to explicit fees or finance charges: paying bills late, going over the credit limit, using cash advances, and paying the minimum amount only. These likelihoods come directly from empirical estimates using the data on credit card behavior, financial knowledge, and demographics. We compare consumers with higher versus lower financial knowledge, with the least financially savvy in our population defined as those who judge their financial knowledge equal to 4 or lower on our seven-point scale. Among cardholders, this group comprises 28.7% of the population. As we mentioned before, the large majority of respondents chose values well above 4. For the less knowledgeable, we calculate both the *average* likelihood of engaging in fee-inducing credit card behaviors as well as the *incremental* likelihood of engaging in these behaviors as a function of having lower financial skills. The latter estimates come directly from specifications analogous to those we employ to characterize the determination of experience segments, where we analyze credit card behavior instead of experience segments. For example, the unconditional likelihood that a cardholder reported incurring at least one over-the-limit charge in the prior year was 5.6%. Our estimation, after controlling for income, demographics, and other factors, is that the incremental probability of incurring an over-the-limit fee for a low financial knowledge individual is 1.5%. Thus, the average likelihood of a less financially knowledgeable individual (representing 28.7% of the population) incurring at least one over-the-limit fee is 7.1%. The detail of the calculations is provided in Appendix Table A2.

The second part of the calculation estimates the *costs* incurred by the cardholder, conditional on engaging in the particular behavior. For late fees, over-the-limit fees, and cash advances, we assume that the individual who admits to these activities has only *one* of these events per year, which is a very conservative assumption. We estimate the cost per incidence from industry data. For cardholders who pay only the minimum amount, we estimate the finance charges paid for 1 year assuming that the cardholder's balance for the low literacy individual equals half the national average balance (which is about $6,000),[22] that stated finance charges equal the national average (14.5% in 2007), and that the cardholder makes no additional purchases during the year. Again, we select these assumptions to be conservative. We are not attempting to measure all of the costs of transacting, even with a credit card, as we have not included finance charges for revolvers who pay more than the minimum, charges for insufficient funds, annual fees, or other charges.

[22] We do not have information on credit card balances for less financially knowledgeable consumers, but these individuals are low income and low wealth individuals. Based on the 2007 Survey of Consumer Finances, balances for the lowest income and wealth quintiles are about half of that of average cardholders. See Buck, Kennickell, Mach and Moore (2009).