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Financial literacy and the cost of borrowing

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Abstract

This research investigates the relation between financial literacy and the cost of borrowing via credit cards and mortgage loans among US consumers. This is a departure from previous studies that have focused on levels of debt in relation to human capital, either financial knowledge or education. Data from the Consumer Finance Monthly (CFM) survey are used to specifically examine the effect of financial literacy on borrowing rates for credit cards and mortgages controlling for other human capital influences. The CFM is a national survey, rich in American consumer credit information, and includes a comprehensive instrument specifically designed to measure financial literacy. Results indicate that those who are financially literate are about twice as likely to have lower costs of borrowing for both credit cards and mortgage loans.

Introduction

The ability to make credit decisions consistent with consumer preferences requires an understanding of credit terms and markets. People with more knowledge and skills (human capital) have the ability to more efficiently search for lower borrowing rates. Financial knowledge may also improve a borrower's ability to manage credit, making them more attractive to lenders. This study examines the relation between financial literacy and interest rates using a new financial literacy instrument in order to estimate whether human capital specific to personal finance (financial literacy) influences consumers' ability to borrow at a lower cost.

Prior literature provides evidence that financial knowledge is related to better credit decisions. A credit card market study finds that as respondents learn more about their credit cards, they make better choices (Agarwal *et al*., 2008). People with lower levels of debt literacy pay a higher share of fees on credit cards than borrowers with higher levels of debt literacy (Lusardi and Tufano, 2009). These studies suggest that a person's finance-related human capital, his/her knowledge and skills specific to personal finance, influences borrowing behaviour.

According to Huston (2010a), financial literacy is defined as measuring how well an individual can understand and use personal finance-related information. Little is known about how financial literacy affects the cost of borrowing, and about how specific financial knowledge and general human capital independently improve a borrower's ability to secure a lower interest rate. Some studies include general human capital, measured through formal education or experience (Calem and Mester, 1995; Crook, 2002; Kerr and Dunn, 2002; Kim *et al*., 2005), while others include more specific human capital measured through financial knowledge questions (Courchane and Zorn, 2005; Lusardi and Tufano, 2009; Robb and Sharpe, 2009). Credit card studies that include financial knowledge focus primarily on debt level rather than cost of borrowing. Studies either include measures of general human capital or specific human capital, but not both. This study examines human capital specific to personal finance (financial literacy) and general human capital (education, age, gender and race) to determine which, if any, have an impact on the cost of borrowing related to credit card and mortgage interest rates.

Model

From an economic perspective, people should choose the least expensive form of borrowing available to them. Human capital can impact the cost of borrowing in terms of limiting available borrowing options as well as the specific borrowing option chosen. Human capital is the stock of knowledge and skills that provide individuals with the potential for productive output. In terms of human capital specific to personal finance, individuals' knowledge about personal finances as well as their skills is of critical importance in determining their level of financial literacy. Financial literacy skills include the ability to appropriately apply personal finance knowledge as well as the confidence to put one's ability into action (Huston, 2010a). Human capital has the potential to influence an individual's financial behaviour, which over time influences the current financial situation (see Fig. 1).

A person's current financial situation, particularly with regard to credit, is captured in their credit report. Information in the credit report is used to calculate a credit score, which has a direct impact on an individual's creditworthiness along with employment and housing stability, income and net worth (Courchane and Zorn, 2005). Creditworthiness determines the set of options an individual has available within the credit market. From these options, a person selects a particular debt instrument, with cost being one of the attributes that influence his/her choice. People with greater stocks of human capital have more potential to make informed and appropriate choices among their pool of options. Individuals with

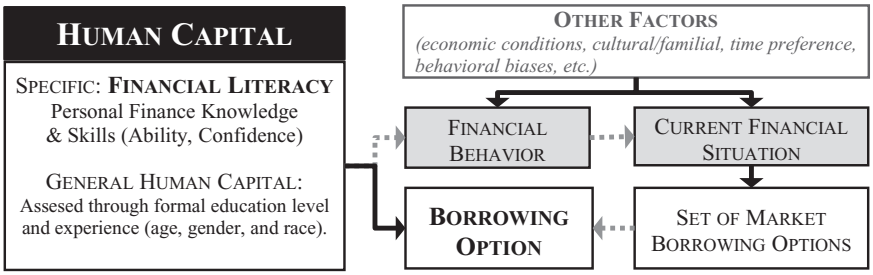

Figure 1 The relation between financial literacy and the cost of borrowing.

lower levels of human capital are more likely to be restricted in the number of borrowing options available to them. Not all variation in financial behaviour can be attributed to human capital's effect on choice. Other factors such as economic conditions, social influences (family, religious, etc.), an individual's rate of discounting future utility (time orientation), as well as behavioural biases can place additional constraints on a person's financial behaviour.

This study examines the impact of financial literacy level on the cost of borrowing regarding credit cards and mortgages using the assessment guidelines proposed by Huston (2010a) and uses data from the Consumer Finance Monthly (CFM) survey to calculate an individual's financial literacy level. It is hypothesized that financially literate individuals will be more likely to have lower borrowing costs compared with those with lower levels of human capital specific to personal finance. This study will also control for more general forms of human capital (education, age, gender and race) to determine if specific or general human capital is more important regarding the cost of borrowing with respect to credit cards and mortgages.

Methods

Data

Data used in this study are from the CFM survey. The CFM is conducted by the Consumer Finance Research Group with the Center for Human Resource Research at The Ohio State University. A module containing a 20-item financial literacy assessment instrument was included with data collected from December 2009 to September 2011. The financial literacy assessment was developed by Huston (2010b) and the CFM survey has financial literacy data for 5048 respondents. The CFM survey also includes data on credit usage, assets, debt, income and demographic information of US households. Data are collected on a monthly basis via telephone interview using computer-assisted telephone interview software and the survey sample is representative of the US population. The sample containing complete information for households with credit cards is 1237, and for households with mortgages is 1851.

Measures and hypotheses

Cost of borrowing

The cost of borrowing is measured through two dependent variables – interest rates associated with a respondent's credit card and mortgage loan. The mean values for credit card and mortgage interest rates were calculated for the sample and respondents were put into one of two groups – above average or below average interest rates. The sample averages for credit card and mortgage loan interest rates were compared with national averages to check for any inconsistencies before proceeding with further analyses.

Financial literacy

To measure the human capital specific to personal finance, this study uses the conceptual framework, financial literacy assessment instrument and scoring grid developed by the *Financial Literacy Assessment Project* at Texas Tech University (Huston, 2010b). During its development, the financial literacy assessment instrument was reviewed by an expert panel comprised of eight members, including five PhDs with personal finance expertise, along with financial planning practitioners and personal finance educators (Huston, 2010b). The instrument shows evidence of being reliable by having a Cronbach's alpha coefficient of 0.85. The 20-item financial literacy assessment instrument includes knowledge and skills items that cover personal finance content covering four areas: basic concepts, borrowing and investing, as well as insurance.

Huston (2010a) argues that financial literacy is more than knowledge human capital and includes skills human capital, particularly the skills of ability and confidence to apply personal finance knowledge. The instrument to assess financial literacy contains a total of 20 items. All of the terminology regarding the financial literacy measure used in this study is from Huston (2010a,b). There are eight items to assess personal finance knowledge (two from each content area), an additional eight corresponding items that assess an individual's skill (or ability) to appropriately apply personal finance knowledge, and four items that assess an individual's skill of confidence in applying personal finance knowledge in each of the four content areas. Sophistication is included in the conceptual model as the confluence of knowledge and the ability to apply the knowledge appropriately (Huston, 2010b). To measure sophistication empirically, the eight knowledge items correspond to the eight ability items and are paired to assess an individual's sophistication within each personal finance content area.

The ability to apply knowledge and the confidence to apply knowledge represent the skills dimension of financial literacy. These 2 financial literacy dimensions, knowledge (represented by 8 items) and skills (represented by 12 items) are weighted equally to determine the overall financial literacy score. Each pair of knowledge-ability items the respondent answers correctly is associated with increased sophistication. The dimensional scores (knowledge, ability, confidence and sophistication) are designated

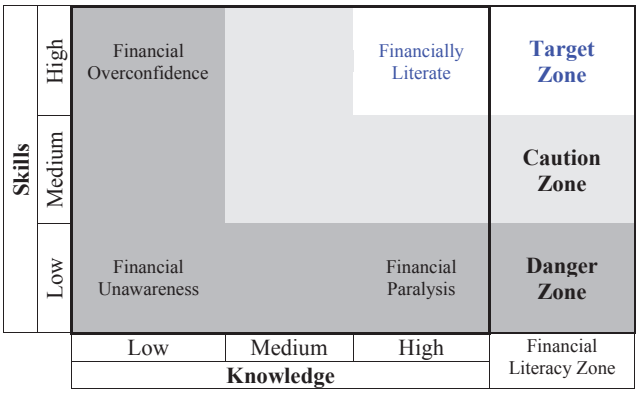

Figure 2 The financial literacy scoring grid and financial literacy zones.

as being high, medium or low, and then plotted onto the financial literacy scoring grid to determine an individual's level of financial literacy (see Fig. 2).

There are three financial literacy zones within the scoring grid – the target zone (high scores in knowledge and application), the caution zone (at least mid-level scores in one or both dimensions) and the danger zone (low scores in either knowledge, application, or both). Within the danger zone there are three subcategories: financial paralysis (respondents with high knowledge and low application), financial overconfidence (respondents with high confidence and low knowledge) and financial unawareness (low scores in both knowledge and application).

It is anticipated that people who are financially literate (i.e. in the target financial literacy zone) will have better odds of paying lower than average interest rates to borrow money, both in terms of credit cards and mortgage loans.

General human capital

Human capital can be attained through education and experience. Respondents are categorized into four levels of education: less than high school, high school education, some college, and at least one college degree. Previous research has found a positive relation between formal level of education and financial knowledge (Lusardi and Mitchell, 2007).

Measures used to proxy for experience are age, gender and race. Because previous research suggests a non-linear, concave relation between age and human capital (Agarwal *et al*., 2008), two variables (age and age squared) are used to capture age as it represents human capital. Gender is used to capture experience regarding human capital related to finances. Perhaps due to differences in interest, motivation and/or socialization, previous research finds that women tend to have less financial knowledge compared with men (Chen and Volpe, 2002; Lusardi and Mitchell, 2007). In the US, non-Whites typically have less familiarity with financial markets (Aizcorbe *et al*., 2003), less familiarity with owning equities (Yao and Hanna, 2005; Hanna and Lindamood, 2008), and tend not to be as trusting regarding financial institutions (Alesina and La Ferrara, 2002). Minority respondents have relatively less experience compared with White respondents, ceteris paribus. Thus, in terms of general human capital attained via experience, we might expect that those who are middle aged (around the inflection point of age and age squared), White and male may have a comparative advantage regarding personal finance human capital.

Current financial situation

The ideal indicator of an individual's current financial situation with regard to creditworthiness would be the credit score. Because the data do not contain this information, debt load (typically used by mortgage lenders and a partial component of credit score calculations) is included to provide a proxy for current financial situation. Debt load is calculated by dividing the household's annual debt repayment obligations by household annual income. Annual debt repayments include payments made towards instalment loans, student loans, payday loans and any other loans the household is making payments towards. Households with lower debt load may have more and better borrowing options available to them making it more likely that a lower-cost borrowing option is within their choice set.

A separate set of regressions for credit cards and mortgages (as the dependent variables) is used to examine the impact of financial literacy on the cost of borrowing. The first regression includes only financial literacy level as the independent variable, subsequent regressions add human capital formation variables including formal education levels and experience indicators (age, gender and race). To partially capture the household's current financial situation (creditworthiness), the debt load variable is also included in the analysis. For each regression, the coefficients can be used to determine the odds ratios which indicate the likelihood each variable has on predicting if the respondent will be in the low-cost borrowing group.

Results

Descriptive statistics

A financial literacy score that weights the knowledge and application dimensions equally was calculated for each respondent. The average financial literacy score for the sample is 58% (see Table 1).

The highest financial literacy dimensional component score is confidence (70%), followed by knowledge (62%), then ability (50%). The mean pairing score for knowledge and ability (sophistication) is 38%. In terms of financial literacy content, borrowing (63%) and personal finance basics (60%) had the highest mean scores followed by insurance (57%). The lowest financial literacy content score was investing, where the average is 50%.

Scores from each of the financial literacy components (knowledge, ability, confidence, sophistication) were plotted on the financial literacy scoring grid to determine the respondent's level of financial literacy. The proportion of respondents who are financially literate (i.e. in the target zone) is 14%. About a third of respondents are categorized in the caution zone and over half of respondents (55%) are in the danger zone. Within the danger zone, nearly a quarter of all respondents are classified as either overconfident (24%) or financially unaware (22%), and 9% are considered financially paralysed. These financial literacy results are very similar to the findings presented by Huston (2010b).

Table 1 Descriptive statistics for human capital and borrowing-related variables

Variable	All frequency[a]	Target zone	Caution zone	Danger zone
Financial literacy				
Total financial literacy score (%)	58	88	71	42
Knowledge score (%)	62	95	83	43
Ability score (%)	50	87	64	32
Sophistication score (%)	38	83	53	18
Confidence score (%)	70	81	73	65
Basic content score (%)	60	90	76	44
Borrowing content score (%)	63	90	65	48
Investing content score (%)	50	86	69	30
Insurance content score (%)	57	86	56	41
Financial literacy zone (%)				
Target	14	100	–	–
Caution	31	–	100	–
Danger	55	–	–	100
Financially paralysed	9	–	–	16
Financially overconfident	24	–	–	44
Financially unaware	22	–	–	40
Education				
Less than high school (%)	5	1	2	8
High school (%)	22	8	13	30
Some college (%)	26	19	26	28
College degree (%)	47	72	58	34
Experience				
Age (mean)	58	55	56	61
Gender (male %)	43	57	50	36
Race (White %)	87	93	90	84
Finances				
Debt load (mean) (%)	28	18	24	36
Annual household income (mean)	$70 488	$113 378	$82 073	$52 390
Annual debt repayment (mean)	$19 409	$20 873	$19 380	$18 988
Credit cards (%)				
None	36	12	21	47
Convenience user	24	50	34	15
Revolver	40	39	45	38
Average rate of borrowing	14.42	13.98	14.21	14.74
Mortgage (%)				
Have mortgage	43	57	52	34
Average rate of borrowing	5.54	5.28	5.41	5.77

[a]Frequencies are provided, except where otherwise indicated (i.e. mean values for age, debt load, annual household income, annual debt repayment, rates of borrowing.

The table provides information regarding the financial literacy, education and experience, debt indicators, and borrowing rates on credit cards and mortgages for adults in the US by financial literacy zone (target, caution and danger).

General human capital was measured by attainment through education and experience. Nearly one half of the sample (47%) is college educated, 26% with some college, 22% has a high school education, and the remainder (5%) has completed less than a high school education. Experience was captured through age, gender and race. The mean age of respondents is 58, 43% are male, and the majority (87%) are White.

Nearly two-thirds of respondents have a credit card (64%). About a quarter of respondents (24%) are convenience users while 40% carry a balance on at least one of their credit cards. The average rate of borrowing for the sample is 14.42%. This is consistent with the national average of 14.9% (Tomasino, 2011). Nearly half of the respondents carry a mortgage loan (45%) and the average interest rate for the sample is 5.5%. During 2010, the weekly average prime interest rates for 30-year fixed mortgages ranged from 4.17 to 5.21% (Freddie Mac, 2010). The average annual household income for the sample is $70 488, the average annual debt repayment is $19 409, and the mean debt load is 28%.

Credit card interest rate regression results

In the first model (M1) when examining all credit card owners, logistic regression results indicate that the level of financial literacy does not impact the odds of being a lower-cost borrower (see Table 2, M1).

Table 2 Cost of credit card borrowing and financial literacy

	M1: All CC holders, FL only ($n = 1237$)		M2: Revolvers, FL only ($n = 866$)		M3: Revolvers, FL and education ($n = 866$)		M4: Revolvers, FL, education experience and debt load ($n = 866$)	
	Est.	Odds ratio	Est.	Odds ratio	Est.	Odds ratio	Est.	Odds ratio
Financial literacy								
Target vs. danger	0.17	–	0.71**	2.04	0.65**	1.92	0.64**	1.91
Caution vs. danger	0.14	–	0.21	–	0.17	–	0.12	–
Education								
High school vs. < HS					0.52	–	0.45	–
Some college vs. < HS					0.40	–	0.22	–
College vs. < HS					0.20	–	0.05	–
Experience								
Age							0.06[a]	–
Age squared							–0.001[b]	–
Male vs. female							0.003	–
Race = White vs. other							0.16	–
Debt load								
Low vs. high							0.57**	1.76
Middle vs. high							0.46**	1.58

***$P < 0.001$, **$P < 0.01$, *$P < 0.05$; [a]$P = 0.1091$, [b]$P = 0.0535$.

CC, credit card; FL, financial literacy; HS, high school.

This table shows the results from a logistic regression using low-cost borrowers as the dependent variable. The first model (M1) includes all credit card holders and shows the impact of financial literacy level on borrowing cost. The second model (M2) is identical, but restricts the sample to only those who use cards for credit purposes. M3 includes education and M4 adds experience and debt load variables as well.

When censoring the analysis to only respondents who carry a balance on their credit cards, i.e. revolvers who pay for credit (M2, Table 2), respondents in the target zone who are financially literate double their odds of being in the lower-cost borrowing group. In the third model (M3), when education level is added to the model, the results indicate that financial literacy remains statistically significant and education does not impact the odds of having lower than average credit card interest rates. In the final model (M4), experience (age, gender and race) is added to the model and the results are similar to M3 in that financially literate respondents are twice as likely to have lower than average borrowing costs compared with the financially illiterate, and general human capital factors (education and experience) do not produce statistically significant results. The *P*-values for the age variables are provided (age = 0.1091, age squared = 0.0535) as they are approaching statistical significance and indicate that initially as age increases the likelihood of having a lower borrowing cost for credit cards increases and then decreases.

Mortgage loan interest rate regression results

The regression results for the likelihood of paying lower borrowing costs for mortgage loans are similar to the results for credit card revolvers. In the first model (see Table 3, M1), respondents in the financial literacy target zone are more than twice as likely, and respondents in the caution zone 83% more likely, to be in the below average mortgage interest rate group compared with respondents in the financial literacy danger zone.

When controlling for education level (M2), the odds decrease slightly and those with a college education more than double their odds of paying lower borrowing costs for a mortgage. Experience (M3) does not appear to impact mortgage borrowing costs when accounting for financial literacy and education levels among respondents. When the debt load is added to the model (M4), the financial literacy and education level relations remain statistically significant and those with the lowest debt repayment amount in relation to income (the bottom third of the sample) increase their odds of being in the lower than average mortgage interest rate group by about half.

Discussion

This study is consistent with previous research that finds the majority of Americans are not financially literate (Lusardi and Mitchell, 2007). Results from this study provide evidence that human capital specific to personal finance, financial literacy, is an important predictor of paying less to borrow with respect to credit cards and mortgage loans. Those who are financially literate are about twice as likely to pay below average interest rates to transfer resources from future periods into the present for consumption compared with those who are not financially literate. This relation is maintained even when controlling for other, more general, forms of human capital as measured through education level and experience via age, gender and race. It would appear that, when human capital specific to personal finances can be accounted for, general human capital is not as important in explaining variation in borrowing costs.

There is no discernable relation between financial literacy and the cost of borrowing among all credit card owners. However, only among revolvers is there a positive relation between being financially literate and paying less than average to borrow. This suggests that financially literate convenience users are not primarily concerned with securing credit cards with lower than average interest rates, which is reasonable if there is no intention to use the

Table 3 Cost of mortgage borrowing and financial literacy

	M1: Financial literacy (FL) only		M2: FL and education		M3: FL, education and experience		M4: FL, education, experience and debt load	
	Est.	Odds ratio	Est.	Odds ratio	Est.	Odds ratio	Est.	Odds ratio
Financial literacy								
Target vs. danger	0.79***	2.21	0.65***	1.91	0.56***	1.76	0.46**	1.60
Caution vs. danger	0.60***	1.83	0.51***	1.67	0.46***	1.59	0.48***	1.61
Education								
High school vs. < HS			0.36	–	0.29	–	0.24	–
Some college vs. < HS			0.36	–	0.29	–	0.23	–
College vs. < HS			0.80**	2.22	0.73**	2.07	0.71*	2.04
Experience								
Age					0.0016	–	0.0035	–
Age squared					–0.0001	–	–0.0001	–
Male vs. female					0.19	–	0.19	–
Race = White vs. other					0.16	–	0.12	–
Debt load								
Low vs. high							0.37*	1.45
Middle vs. high							0.15	–

***$P < 0.001$, **$P < 0.01$, *$P < 0.05$, $n = 1851$.

FL, financial literacy; HS, high school.

This table shows the results from a logistic regression using low-cost mortgage borrowers as the dependent variable. The first model (M1) includes the impact of financial literacy level on borrowing cost. The second model (M2) includes education, the third model (M3) adds experience, and the M4 adds debt load as additional explanatory variables.

credit card as a borrowing instrument. Among those who do choose to borrow using credit cards, those who are financially literate pay less to do so. In terms of credit card borrowing costs, the human capital that is specifically related to personal finance, i.e. financial literacy, plays a more significant role in paying below average borrowing costs compared with education and experience.

For mortgage owners, the relation between financial literacy and borrowing costs is similar. Financial literacy level consistently has a positive, statistically significant and substantial impact on the likelihood of paying less than average to borrow. Having a college degree and a relatively low-debt load also significantly increase the odds of having a lower than average mortgage interest rate. Having a lower debt burden directly and positively impacts an individual's credit score. College educated people tend to have better paying and more stable employment. A person's credit score and employment stability directly impact creditworthiness and the ability to attain lower interest rates for borrowing.

Conclusions

The majority of Americans are financially illiterate, and for some this translates into paying higher than average costs to borrow. Those who can borrow at a lower rate have more resources to devote to activities that will provide utility. Over time, this has the potential to substantially contribute to lifetime satisfaction. Becoming financially literate at a younger age provides a longer horizon to benefit from the investment. While it is apparent from this study that being financially literate matters, this study does not address how one becomes financially literate. Although debt load is included to represent current financial situation, it would be ideal if credit score could be included in the analysis.

This study is unique in that it examines both specific (financial literacy) and general (education and experience) forms of human capital in relation to the likelihood of having lower than average borrowing costs. Given the results for education level while accounting for financial literacy, the implication is that formal education may not be efficiently producing the knowledge and skills that constitute financial literacy. Huston (2011) finds that while there is a positive relation between education and financial literacy levels, only 2 of every 10 college graduates are financially literate. A college education may be more of a signal of credit worthiness rather than an indication of financial literacy.

People who are financially literate are more likely to pay less to borrow, either because they have made cumulative financial decisions that result in a financial situation that allows them to select from a number of lower cost borrowing options, or they are better able to select among borrowing alternatives, or both. Additional research is required to better understand how financial literacy affects the financial decision-making process, what circumstances lead to becoming financially literate, and at what cost. This study does not establish the extent to which financial literacy level directly impacts borrowing choice as opposed to indirectly affecting borrowing options through financial behaviour over time. Subsequent research to disentangle these effects may provide additional insight into the role of personal finance human capital on financial decision making.

The results from this study do provide evidence that being financially literate increases the odds of making cost-effective borrowing decisions among American consumers. These cost savings have the potential to not only increase the welfare of financially literate households, but also to reduce the burden on governments of subsidizing households who are unable to make efficient choices.

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