

FINANCIAL LITERACY AND CONSUMER CREDIT PORTFOLIOS

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Abstract

We use survey data from a sample of UK households to analyse financial literacy and consumer credit portfolios. We first show that individuals who borrow on consumer credit exhibit worse financial literacy than those who do not. Borrowers with poor financial literacy hold higher shares of high cost credit (such as home collected credit, mail order catalogue debt and payday loans) than those with higher literacy. We also show that individuals with poor financial literacy are more likely to lack confidence when interpreting credit terms, and to exhibit confusion over financial concepts. They are also less likely to engage in behaviour which might help them to improve their awareness of the credit market.

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1. Introduction

Consumers who make use of credit to finance consumption purchases need to understand the financial cost of the credit they use. Mature credit markets offer a broad variety of consumer credit products, including consumer loans, credit cards, hire purchase loans, car loans, catalogue loans, home credit and payday loans. Consumer marketing of these products shares a common set of semantics for expressing the cost of borrowing in terms of interest rates. Regulatory bodies commonly mandate that consumer credit adverts show common interest rate-based measures of the cost of credit to allow life-for-like comparison across heterogeneous products, most commonly using an Annualised Percentage Rate (APR). But do consumers understand these expressions of the cost of credit and, if not, what are the financial costs associated with misunderstanding?

In this paper we measure consumers' understanding of basic financial calculations relevant to the cost of consumer credit, such as the use of interest rates, annualised percentage rates (APR), interest compounding over time and also the notion of a minimum payment on a credit contract. Among users of consumer credit, 11% fail to answer correctly any one of the three financial literacy multiple choice questions on simple interest, compound interest or minimum payments. At the other extreme, 30% of respondents answer all three correctly. Wrong answers typically arise because households underestimate the cost of consumer credit when performing the calculations required by the financial literacy questions.

The existing empirical literature on financial literacy finds that individuals who participate in financial markets exhibit, on average, better understanding of core financial concepts relevant to those markets compared to individuals who do not participate. Such studies have been carried out on saving plans for retirement (Bernheim, 1998; Lusardi and Mitchell, 2007; Banks et al, 2010; Clark et al, 2011; Hastings et al, 2011) and stock market

participation and portfolio selection (Haliassos and Bertaut, 1995; Guiso and Jappelli, 2009; van Rooji et al., 2011a, 2011b; Yoong, 2011). Since decisions to invest in financial literacy arise endogenously depending upon individual financial scenarios (Jappelli, 2010; Jappelli and Padula, 2011), some studies use instruments for financial literacy which create variation in levels of literacy within samples uncorrelated with financial market choice. (Lusardi and Mitchell, 2007; van Rooji et al., 2011a, 2011b). There is also new evidence that since the onset of the financial crisis consumers with more understanding of banking supervision and insurance have more extensively diversified their asset portfolios across banks (Van der Crujssen et al., 2011).

Consumers who engage in borrowing on the consumer credit market have an obvious incentive to acquire understanding of the terms in which consumer credit is priced in order to make informed decisions about borrowing. However, in contrast to the literature on financial literacy and retirement saving or stock market participation, we show that individuals who participate in consumer credit markets actually display, on average, *poorer* levels of financial literacy compared to those who do not, even conditioned on characteristics such as income and education. Furthermore, individuals who are deeper into consumer credit markets by holding higher debt-to-income ratios show yet poorer levels of financial literacy. Hence participation does not appear to induce greater knowledge of the workings of the consumer credit market.

We then analyse the relationship between financial literacy and the portfolios of consumer credit held by consumers. We find consumers with poor understanding of the cost of consumer credit products typically hold portfolios with higher weighted average APRs and have larger shares of high cost credit such as home credit and payday loans in their credit portfolios. We also present evidence that consumers with low levels of understanding of consumer credit products self-report being less confident in decisions relating to credit use,

are generally more confused about financial products and are less likely to engage in basic behaviours which would improve their search for products and information such as reading the financial pages in newspapers and magazines.

Most consumers with positive consumer credit holdings hold multiple consumer credit products in their portfolio. In our data, we are able to observe, for each household, individual credit holdings across an exhaustive range of consumer credit types, in each case observing the balance outstanding, contractual payment obligation on the product and value of any arrears accrued on the product. We match data on representative APRs on each product using industry-provided figures. Alongside this consumer credit portfolio data, we survey households on their financial literacy using a multiple choice question module inserted into the household survey. We then analyse the relationship between financial literacy scores and consumer credit portfolios, focusing on weighted average APR measures of the cost of the portfolio.

We obtain several new results in the financial literacy literature. We document the notable degree of heterogeneity in financial literacy and in portfolio APRs across households holding consumer credit. Households with poor literacy scores exhibit weighted average portfolio APRs on their consumer credit which are 9 percentage points higher than households who answer all questions correctly (64% higher) and have portfolio shares of high cost consumer credit which are eight times larger than those who answer all questions correctly. We also show that consumers with poor financial literacy are typically aware of their lack of understanding about finance and typically self-report they are less confident when making borrowing choices which involve calculating the cost of consumer credit. However, despite this evidence of self-awareness of the part of less literate consumers, they are also less likely to engage in the most readily available and straightforward behaviour which might improve their understanding of consumer credit terms, and their understanding

of financial markets more generally: they are less likely to read the finance-related pages in the news media.

We show that this variation is not for the most part attributable to related household characteristics that might ration credit supply to the household. Households which perform poorly on the financial literacy questions exhibit on average lower incomes, lower levels of home ownership, less education, lower levels of employment and higher levels of unemployment. These characteristics might imply that they face tighter credit supply constraints compared with households that exhibit higher levels of income, employment and home ownership (which are likely to be correlated with more access to credit). However, conditional upon such covariates, regression estimates show positive and statistically significant effects arising from financial literacy. As a consumer's financial literacy is not observed by a lender, and hence is not a characteristic on which the lender can discriminate in a credit supply decision, we interpret these estimated effects, conditional on related coefficients on which lenders might discriminate, as arising due to poor consumer understanding of the credit market.

Our results therefore provide a direct measure of the cost of consumer misunderstanding in the consumer credit market, in the form of differences in APRs across households holding other characteristics constant. We contribute to a broader literature on consumer behaviour in credit markets which seeks to understand the drivers of observed consumer behaviour and determinants of effective credit market participation (Agarwal et al, 2006; Campbell, 2006; Gabaix and Laibson, 2006; Tufano, 2009; Meier and Sprenger, 2010; Stango and Zinman, 2009, 2011; Vissing-Jorgensen, 2011).

2. Survey Data and Financial Literacy Questions

Our dataset is the October 2010 wave of the quarterly Debt Track survey undertaken by the UK market research organisation YouGov, conducted via the internet.¹ Each wave surveys a representative sample of approximately 3,000 UK households drawn from YouGov's panel of around 350,000 interviewees. The Debt Track survey is limited to interviewees who state they are the main respondent in their household, although respondents are asked to complete the survey on behalf of the household unit and are asked questions which refer, where applicable, to their partner/spouse as well as to themselves. For questions concerning finances, respondents are asked to state values for the assets and debts of the household as a whole. Respondents are paid for completing the survey, which takes approximately 45 minutes to complete.

The survey covers a broad range of household demographics and socio-economic characteristics. As the survey title suggests, however, the main emphasis of the survey is on household credit and debt, with a specific focus on consumer credit (though the survey also contains details of secured debts i.e. mortgages). The survey covers the full range of credit instruments held and used by respondents. Respondents are presented with an exhaustive menu of credit product types and are asked to state which product types are held by members of their household, how many of each type they hold, the current balance on each product, the contractual monthly payment on each product and whether they are one month in arrears and whether they are three months in arrears. In the case of credit cards and store cards which can be used for transactions purposes only, respondents are asked to state their current revolving balance (i.e. balance not paid off in full on their last credit or store card statement).

¹ There is evidence to suggest that internet based surveys generate less bias in responses when compared to telephone interview-based surveys (Chang and Krosnick, 2008).

Respondents are not asked to state the current interest rate they pay on each consumer credit product held by the household. There would be difficulties in doing so – across the range of consumer credit products there is considerable variation in simple interest rates, fees and charges applied plus the payment period. Survey respondents are unlikely to be able to state accurate APRs for the products they hold. So instead we use industry-provided data on typical product APRs to assign an APR to each product type. Using this APR measure we calculate weighted average interest rates for individual portfolios.

The industry data we use is provided by the Finance and Lending Association, the UK industry body with oversight of the consumer credit sector. Based on their members' loan books, on a monthly basis the FLA calculates representative average APRs for consumer credit products sold in the UK. The calculation of a 'representative APR', under criteria set down by the Financial Services Authority (FSA), is that of a value not less than the APR paid by at least 66% of the creditor's customers. Lenders, who have an obvious incentive to market their credit products as cheaper than the rate they would offer in an actual typical credit offer to a customer in order to encourage potential customers, are obliged to clearly present representative APRs in their marketing materials under the 2008 European Union Consumer Credit Directive. Hence the APRs we assign to individual products are representative in the sense that they are an illustrative rate at which the majority of current borrowers borrow on that product.

We have incorporated into the YouGov survey our own three questions used to measure financial literacy. The questions take a multiple-choice format, do not require the respondent to make complex mathematical calculations and are framed in the context of everyday scenarios and decisions. The questions relate to a simple interest calculation, understanding the impact of compound interest and understanding the impact of paying only

minimum payments on a credit contract. In each question there are large differences between the correct answer and incorrect alternative answers offered to the respondent.

The questions we used might be characterised in the conceptual model of Hung et al. (2009) as measuring ‘financial knowledge’ as opposed to perceived knowledge or financial skills, the other components of the Hung et al. model of financial behaviour. Our questions are in the format of numerical multiple choice questions similar to those used in the US Health and Retirement Study (HRS). We have good reason to think that these questions are accurate measures of respondents’ understanding of core concepts in consumer finance. Hung et al. investigate the internal consistency of financial literacy questions of this type using the American Life Panel (the internet test bed for the HRS) and find that questions in this format consistently exhibit Cronbach Alpha scores in excess of 0.7. They also find that in repeated surveys among respondents multiple choice questions of this type used to generate repeat test scores are strongly positively correlated at high degrees of statistical significance and explain a broad array of behaviours such as investing, retirement planning and stock market participation. The three questions we use are:

Simple interest question

“Cheryl owes £1000 on her bank overdraft and the interest rate she is charged is 15% per year. If she didn’t pay anything off, at this interest rate, how much money would she owe on her overdraft after 1 year?” £850 / £1000 / £1150 / £1500 / Do not know.

Interest compounding question

“Sarah owes £1000 on her credit card and the interest rate she is charged is 20% per year compounded annually. If she didn’t pay anything off, at this interest rate, how many years would it take for the amount she owes to double?” Less than 5 years / Between 5 and 10 years / More than 10 years / Do not know.

Minimum payments question

“David has a credit card debt of £3000 at an Annual Percentage Rate of 12% (or 1% per month). He makes payments of £30 per month and does not gain any charges or additional spending on the card. How long will it take him to pay off this debt?” Less than 5 years / Between 5 and 10 years / More than 10 years / None of the above, he will continue to be in debt / Do not know.

3. Consumer Credit Usage and Portfolio Characteristics

Summary statistics for our sample of households are shown in Table 1. We distinguish between households with no consumer credit and households with positive consumer credit balances on at least one credit item. Approximately two thirds of our sample holds no consumer credit.² The summary statistics show that households holding consumer credit are typically younger, more likely to have dependent children, and differ in their employment characteristics compared with households that do not. They are also more likely to hold secured debt and are less likely to be social renters.

Average household income among households holding consumer credit is slightly higher than among households not holding credit. Respondents from households with consumer credit on average answer fewer of the financial literacy questions correctly compared with respondents from households without consumer credit. The average number of questions answered correctly by respondents from households holding consumer credit is 1.78 (out of 3) compared to 1.86 for respondents from households without consumer credit. For the second and third questions, on average the correct response rate among those borrowing on consumer credit was ten percentage points lower than among those who do not

² Of course, many more households in the survey have credit instruments, such as credit and debit cards, and overdraft facilities, on which they do not have net (revolving) balances.

borrow on consumer credit. However, there are also differences between these groups in demographic characteristics, labour market status, education and income.

Table 2 presents results from a series of Probit models (a full list of covariates is provided in the notes accompanying the Table) for each financial literacy question in which the dependent variable is in each case a 1/0 indicator dummy, with a value of 1 denoting whether the individual answered the question correctly. Two Probit specifications are shown for each question: firstly, a specification in which individuals who borrow on consumer credit are identified by a single 1/0 dummy and, secondly, a specification in which a series of 1/0 dummy variables are included which categorise individuals who borrow on consumer credit into quintiles of the distribution of the debt to income ratio (where an individual's debt to income ratio is calculated by dividing the total value of net outstanding borrowing on all consumer credit items by gross annual income). The first (top) quintile of the debt-to-income distribution has an upper bound of 0.86 and a lower bound of 0.49. The fifth (bottom) quintile has an upper bound of 0.12 and a lower bound of 0.04.

Results indicate that, for each question, borrowing on consumer credit is associated with a statistically significant lower likelihood of answering correctly. The marginal effects differ in magnitude across specifications. In the case of the simple interest model, the marginal effect of 0.02 is very small against the baseline predicted probability of 0.86. However, for the compound interest question the marginal effect of 0.07 against the baseline probability of 0.56 implies individuals borrowing on credit are 13% less likely to answer this question correctly. In the case of the minimum payments question this magnitude increases to 23%. Results from the specifications incorporating the debt to income quintile indicator variables show individuals with higher levels of consumer credit borrowing relative to their income (in the first, second and third quintiles of the debt to income distribution) are much less likely to answer each of the questions correctly, though low levels of consumer credit

relative to income are not associated with lower likelihood of answering a question correctly. For the highest debt group in the first quintile of the distribution the likelihood of answering the minimum payments question correctly is approximately one half that of an individual without any consumer credit borrowing.

Table 3 provides several summary statistics for the consumer credit products which comprise household consumer credit portfolios.³ The range of credit products held by households in our sample includes commonly held forms of credit such as credit cards, personal loans, mail order credit and car loans, together with less commonly held forms of credit such as home collected credit (otherwise known in the UK as doorstep lending), payday loans and credit union loans. We include loans from friends and family members in our definition of ‘consumer credit’ (and assign these an APR of 4%), though the regression results we subsequently show alter very little according to whether we include these loans within our definition of consumer credit or include them as an additional covariate.

As can be seen from Table 3, credit card debt and personal loan debt are the two largest components of household portfolios, both by incidence and average value of holdings. The more expensive forms of credit – home credit, pay day loans, credit union loans and hire purchase agreements – are typically minority holdings within household portfolios. It is also notable that across the range of credit products, all are typically held as part of a portfolio of two to four other credit products.

Summary statistics for responses to the financial literacy questions are shown in Table 4. Beginning with the distribution of responses across the questions in Panel A, 84.3% of

³ We omit loans from the Student Loan Company and ‘Department for Social Security Loans’ from our definition of ‘consumer credit’ as the former are educational loans with income-contingent repayment schedules and the latter are loans based upon social security entitlements.

respondents answered the simple interest question correctly. The most common incorrect choice was £1500, although a few respondents mistakenly stated the value of the debt would reduce by £150 instead of increase by £150. More respondents made mistakes than chose the 'do not know' option. For the compound interest question the proportion of respondents choosing the correct response fell to 52.1%, the most common error among respondents being a failure to appreciate that compound interest would cause the balance to double within 5 years, choosing instead the 5-10 year period for the balance to double. As with the first question more respondents chose an incorrect answer than 'do not know'. For the minimum payment question the 42.2% of respondents chose the correct answer, with an approximately even proportion of respondents mistakenly choosing 5-10 years or >10 years.

Panel B provides a breakdown of correct response rates across the three questions by the number of questions answered correctly. Among those respondents who answered only one question correctly, the simple interest question was overwhelmingly answered correctly. Among respondents who answered two questions correctly nearly all answered the simple interest question correctly and two-thirds answered the compound interest question. This suggests a general natural ordering in the difficulty of the questions across respondents from the easier simple interest question to the harder minimum payment question. It also suggests a low level of guessing among individuals who did not state the correct answer.

Table 5 presents summary statistics for characteristics of households categorised by the financial literacy score of the respondent. Respondents answering more questions correctly were, on average, more likely to be employed, less likely to be unemployed or retired, more likely to have a spouse in employment and had spent longer in full-time education. They were also more likely to be homeowners with mortgages and less likely to be social renters, though approximately 40% of those who answered none of the questions correctly were mortgaged homeowners. Respondents who answered more questions correctly

were also from households with higher average income, with larger average outstanding consumer credit balances and also larger average ratios of outstanding consumer credit to household annual income.

The final two rows of Table 5 provide average values for portfolio-weighted average APRs and for the average portfolio share of high cost credit. These statistics show a correlation between poor literacy scores and higher cost consumer credit portfolios. The weighted average APR is a simple weighted average calculated using the industry provided APR data for individual credit product types and portfolio shares based on respondents reported outstanding balances on each consumer credit type. The average weighted APR across the whole sample is 18%. As can be seen from the table, weighted average APRs on portfolios of outstanding credit are lower among households with respondents who answered more of the financial literacy questions correctly. The difference between mean weighted averages APRs between households with respondents who answered all financial literacy questions correctly compared with households with respondents who answered all the financial literacy questions incorrectly is 9 percentage points (65%) and 7 percentage points (50%) against those who answered only one question correctly.

In the final row we report mean values for the portfolio share which is comprised of high cost credit. Our categorisation of 'high cost credit' items along with their representative APRs is: store cards (30%), credit unions (32%), mail order catalogues (35%), pay day loans (300%), home credit (250%) and hire purchase credit (24%) with the remaining credit items in Table 2 treated as 'low cost credit'. The mean high cost credit share across the whole sample is 17%. Households with respondents who answered all questions correctly have mean high cost credit shares in their portfolios of 5%; for households with respondents who answered only one question correctly this rises to 25% and rises again to 38% for households with respondents who answered no questions correctly.

4. Econometric Analysis of Portfolio Weighted APRs and High Cost Credit Shares

The previous section suggested that poor levels of financial literacy are associated with higher cost consumer credit portfolios. However, the summary statistics also reveal that households with respondents who typically did better on the financial literacy questions also had different household characteristics from those who fared poorly. Typically, however, household characteristics are likely to be associated with the availability of credit to household. Hence, this finding might suffer from the classic problem in the empirical analysis of consumer demand for credit: namely the inability to distinguish credit demand from supply on the basis of characteristics such as income, employment and housing tenure. Since lenders base their decisions on ability to repay, which correlates with a range of household characteristics, there is a strong likelihood that certain characteristics positively correlated with credit demand will also be positively correlated with credit supply.

In this section, therefore, we present a multivariate analysis using a series of regression models that control for these characteristics and that estimate the impact of financial literacy on consumer credit portfolios. Our identifying restriction in these models is that individual financial literacy, observable to us as researchers using our survey method, and a key component of informed consumer search in the credit market, is not observable to lenders and so does not enter lender credit supply functions. That is, we identify the impact of financial literacy on the demand for consumer credit on the basis that, conditional on a broad set of covariates which may be endogenous to the observed availability of credit to the household and correlated with financial literacy, the relationship between financial literacy and credit portfolio composition is purely a demand-side effect representing the efficiency of search for credit products on the part of the household.

Table 6 presents estimates from OLS models in which the dependent variable is the households' portfolio-weighted APR. The mean of the dependent variable in the sample is 18%. Selected coefficients are reported alongside standard errors and indicators of the level of significance. The full list of additional covariates included in the model, which includes a broad set of demographic, socio-economic and financial controls, is provided in the notes accompanying the table. Turning first to the coefficients shown on reported control variables in the table the estimates show that homeownership and, to a less extent, private renting (compared with the omitted group of social renting) is associated with lower cost portfolios, as is higher household income. Other covariates shown in the table of results do not attract statistically significant coefficients other than one age of head of household dummy.

The coefficient on the financial literacy score in Column 1 is positive and statistically significant at the 1% level. The coefficient value of -1.76 implies that a one point higher financial literacy score on the scale of 0-3 is associated with a decline in the portfolio weighted average APR of 1.76 percentage points. Extending this analysis, in the second column, we include three 1/0 dummy variable indicators for whether the respondent answered each of the three financial literacy questions correctly. Hence the omitted group are those households with respondents who answered all questions incorrectly. Only the dummy variable indicating that the respondent answered the minimum payments question correctly is negative and statistically significant at the 1% level. The coefficient value of -4.36 implies a household with a respondent who answered this question correctly holds a portfolio with a portfolio weighted average APR which is 4.36 percentage points below that of a household with a respondent who answered this question incorrectly. The baseline portfolio weighted average APR across all households in the sample is 18 percentage points, so this value of 4.36% corresponds to a 24% reduction in the cost of the credit portfolio.

Table 7 presents regression estimates in which the dependent variable is the high cost credit share within each household's portfolio. Estimates from a Tobit model with censoring at zero are presented alongside OLS estimates. 68.6% of households have a high cost credit share of zero; the average high cost credit share among those with a non-zero value is 54.5%, and the average across the whole sample is 17%. The OLS estimates in Column 1 imply that a one unit increase in the financial literacy score is associated with a 5% point decrease in the high cost credit share in a household portfolio. The results in Column 2 show that this relationship is driven by households with respondents who answered the simple interest and minimum payments questions correctly. The coefficient on the compound interest variable is also negative but not statistically significantly different from zero.

Columns 3 and 4 present estimates using a Tobit specification. The coefficient on the financial literacy score in Column 3 is now larger compared with the OLS model, the value of -0.15 implying that household with a respondent with a one point higher financial literacy score has a high cost credit share which is 15% points lower. Again, the estimates in Column 4 show this result is driven by households with respondents who answered the minimum payments question correctly. The coefficient on the minimum payments variable implies households with respondents who answered this question correctly hold high cost portfolio shares which are 24% points lower compared with households who answered this question incorrectly.

Taken together, results from Tables 6 and 7 show that the financial literacy measures included in the models have significant negative associations with measures of the cost of credit products in households' portfolios. The results for the high cost credit share models show particularly strong results: against a baseline high cost portfolio share for the whole sample from the model estimates of 17.5%, the coefficient on the financial literacy score in Column 3 implies a one point improvement in financial literacy score is associated with a

reduction in the share of a household's portfolio which is made up of high cost credit items of 86%. Hence there is an economically large and statistically significant reduction in the use of high cost credit associated with higher financial literacy scores.

5. Financial Literacy, Self-Awareness and Behaviour

In this section we investigate whether individuals with poor financial literacy are in general self-aware of the mistakes they make in calculations involving consumer credit terms, and whether they engage in a basic behaviour which would help them to become more aware of financial concepts and generally better informed about financial products and markets. The basic behaviour we consider is reading the financial pages in the news media. Finance sections in newspapers or on news websites are a low cost source of timely and relevant information about financial products and issues. Many finance sections in mainstream newspapers also seek to educate their readership on basic issues relating to investing and borrowing. The combination of poor financial literacy and active participation in the credit market presents an incentive, apparent at least for self-aware individuals, to invest in such financial knowledge. However it might also present a barrier to financial learning and information acquisition and deter individuals from taking an interest.

First, we turn our attention to whether individuals with poor financial literacy are typically aware that they lack understanding of core financial concepts. To do so we make use of two survey questions which ask individuals to evaluate their own understanding of finance. The first question specifically relates to consumer credit decisions, the second relates to understanding finance more generally. The two questions are:

'When you are shown information about a financial product such as a loan, credit card or store card, on a scale of 1 to 7, how confident are you that you understand the total amount you would need to repay?'

and, secondly:

'How much do you agree or disagree with this statement:

“Financial services are complicated and confusing to me”

Answers: Agree strongly/Tend to agree/Neither agree nor disagree/Tend to disagree/Disagree strongly/Don't know'

Summary statistics for respondents' answers to these questions are shown in Table 8. Individuals who answered all questions stated they were very confident that they understand the amount they have to repay; on average the score (out of 7) for this group was 6.14. By contrast, individuals who answered all questions correctly rated their confidence as much lower, almost by half, at 3.13. Similarly, the proportion of individuals who stated they find finance confusing (the variable is coded to 1 if the individual responded 'agree strongly' or 'tend to agree' and 0 otherwise) in the group answering all questions correctly was half that of the group who answered all questions incorrectly or only one question correctly.

Regression estimates in Table 9 show this correlation between financial literacy and self-evaluated financial confidence and confusion is not simply explained by covariates in the regression model, such as age effects (or cohort effects) whereby younger individuals are likely to have less experience in financial markets but older individuals are likely to have poorer cognitive function (as in Agarwal *et al* 2009). The estimates in Column 1 imply that a one unit increase in the financial literacy score is associated with a six percentage point decrease in the likelihood of a respondent stating they were confused by finance; evaluated against a baseline probability of 38% this represents a 16% decrease in the likelihood. Column 2 presents results from a Probit model in which dummy variables to indicate correct answers to each question are entered separately. The coefficients on the compound interest

question dummy and the minimum payments question dummy are both negative, though only the former is statistically significant (at the 1% level).

Columns 3 and 4 present results from OLS specifications in which the dependent variable is the respondent's evaluation of their confidence in interpreting information relating to the cost of consumer credit on a 0 to 7 scale. In Column 3 the coefficient on the financial literacy score is positive and statistically significant at the 1% level. In Column 4 the coefficients on each of the dummies indicating correct answers to each of the three questions are positive and statistically significant, though in the case of the simple interest question dummy variable the coefficient is only statistically significant at the 5% level. Hence there is evidence that even relatively small improvements in financial literacy such as the ability to make a simple interest calculation are associated with increases in financial confidence. The coefficient on the financial literacy score in Column 4 implies that a one point increase in the financial literacy score is associated with a 0.47 point increase in financial confidence, which evaluated against the baseline score is an increase of approximately 10%.

Finally, given this evidence that individuals with poor measured financial literacy from our survey questions are typically self-aware of their lack of understanding of finance and self-report that this affects their confidence in their ability to make correct calculations when making credit decisions, we incorporate an additional question relating to the acquisition of financial knowledge and understanding. We asked the following question of all respondents to the survey:

'How much do you agree or disagree with this statement:

"I regularly read the personal finance pages in the press"

Answers: Agree strongly/Tend to agree/Neither agree nor disagree/

Tend to disagree/Disagree strongly/Don't know'

As shown in Table 8, individuals who answered all the financial literacy questions correctly are three times more likely to read the financial pages in the press, with 62% of this group stating 'agree strongly' or 'tend to agree' with the statement compared with 19% in the group who answered all the questions incorrectly. The estimates presented in Column 5 of Table 9 imply that a one point improvement in the financial literacy score is associated with a 7 percentage point increase in the likelihood of regularly reading the financial press. Evaluated against a baseline average of 25% this represents a 28% increase in the likelihood. Estimates in Column 6 show that individuals who answered the compound interest and minimum payments questions correctly are more likely to be in this category of reading the financial press.

This correlation between financial literacy and reading the financial press should be interpreted as an association: the direction of causality is not established in these cross-section estimates. The main inference is that poor financial literacy, though typically acknowledged by individuals in their responses to questions about their confidence in interpreting credit cost data and more generally to their finding 'finance matters' confusing, is associated with less exposure to information provided in the news media relating to finance.

6. Conclusion

This paper has analysed the relationship between financial literacy and consumer credit portfolios. The data source was a representative sample of UK consumer credit users, utilising questions that explore their understanding of basic topics in financial literacy. The questions used might appear simple, even trivial, to an academic audience with a rudimentary understanding of mathematics and basic financial concepts. However, results show that while the large majority of individuals sampled can undertake a simple interest calculation, only a little more than half can correctly answer a straightforward question relating to compound

interest and fewer a straightforward question relating to minimum payments on a credit card. None of the questions required more than basic mathematical skills.

There is a clear relationship between financial literacy and the composition of household consumer credit portfolios. The empirical models used incorporate a broad range of household and household head characteristics on which lenders might choose to ration credit supply and, given this conditioning on observable characteristics, we believe that the coefficients on financial literacy variables represented the impact of financial literacy on household choice of credit product. Results from the multivariate analysis show that households with household heads who perform poorly on the financial literacy questions hold a greater fraction of high cost credit in their portfolios and thereby have higher portfolio-weighted average APRs.

Further results on the relationship between financial literacy and the household head's self-evaluation of his or her ability to interpret information on the cost of credit products and, more generally, matters of finance, show that household heads with poor financial literacy were typically self-aware of that fact. Furthermore, household heads with poor financial literacy are less likely to acquire information relating to consumer finance through reading the financial pages in the press.

These results suggest there are large costs, in the form of higher APRs across portfolios, to participating in the consumer credit market with low levels of understanding of core elements of the pricing of consumer credit and debt. While a natural implication might be that financial education programs or other public policy measures to improve individuals' understanding of basic concepts in finance might yield benefits, existing studies offer mixed evidence on the effectiveness of financial education programmes (Willis, 2011; Fernandes et al., 2012).

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Table 1:
Sample Characteristics

	No Consumer Credit	Consumer Credit
N	2184	853
<i>Demographics</i>		
Age 18 - 24	0.10	0.06
Age 25 – 34	0.17	0.26
Age 35 - 44	0.17	0.23
Age 45 - 54	0.16	0.21
Age 55+	0.40	0.24
Male	0.52	0.47
Married	0.64	0.68
Dependent Children	0.16	0.27
<i>Employment and Education</i>		
Employed	0.52	0.70
Unemployed	0.05	0.04
Retired	0.24	0.10
Spouse Employed	0.39	0.47
Spouse Retired	0.16	0.09
Age Left Full-Time Education	18.2	18.6
<i>Housing Tenure</i>		
Outright Owner	0.33	0.14
Mortgaged Owner	0.32	0.45
Private Renter	0.15	0.21
Social Renter	0.08	0.12
<i>Income and Credit</i>		
Gross Household Income	£34,700	£37,600
Consumer Credit	£0	£6,300
<i>Financial Literacy</i>		
Simple Interest Question	0.87	0.83
Interest Compounding Question	0.61	0.50
Minimum Payments Question	0.48	0.41
Average Literacy Score	1.86	1.78

Notes: an individual is categorised as borrowing on consumer credit if they hold a positive balance on at least one consumer credit loan, or a revolving balance on at least one credit / store card, net of liquid deposits held by the individual (a balance which could not be cleared before the period in which interest and charges are due).

Table 2
Probit Estimates: Consumer Credit Use and Financial Literacy

	simple interest		interest compounding		minimum payment	
	1.	2.	3.	4.	5.	6.
consumer credit = 1	-0.02*	-	-0.07**	-	-0.10**	-
	(0.01)		(0.02)		(0.02)	
<i>Quintile of debt/income distribution</i>						
1 st quintile	-	-0.06**	-	-0.14**	-	-0.21**
		(0.01)		(0.04)		(0.04)
2 nd quintile	-	-0.05**	-	-0.10**	-	-0.14**
		(0.01)		(0.03)		(0.03)
3 rd quintile	-	-0.02*	-	-0.03**	-	-0.04**
		(0.01)		(0.01)		(0.02)
4 th quintile	-	-0.01	-	-0.02*	-	-0.01
		(0.01)		(0.01)		(0.01)
5 th quintile	-	-0.01	-	-0.01	-	-0.01
		(0.01)		(0.01)		(0.01)
N	3041	3041	3041	3041	3041	3041
baseline probability	0.86	0.86	0.56	0.56	0.44	0.44

*Notes: * denotes statistical significance at 5% level, ** denotes statistical significance at 1% level. Additional control variables included in all specification are: age (1/0 dummy variables for 10 year age bracket), 1/0 dummy variables to denote male, married, non-married couple, divorced (omitted group: single), employed, retired, unemployment (omitted group: disabled out of the labour force), spouse employed, spouse unemployed, spouse retired (omitted group: spouse disabled or out of the labour force), homeowner (omitted group renter) years in full-time education*

Table 3:
Summary Statistics for Consumer Credit Portfolios

Mean Values for Households with Positive Balances on Product

Credit Product	Typical APR	% Positive Balance	Outstanding Balance	Portfolio Share %	Number Other Products Held
Credit Card	17%	55.8%	£4,400	41%	2.6
Store Card	30%	8.4%	£920	3%	3.7
Personal Loan	14%	28.1%	£6,700	19%	3.1
Friend / Family	4%	7.9%	£4,200	11%	2.6
Overdraft	19%	3.3%	£1,200	2%	2.5
Hire Purchase	24%	6.5%	£3,500	4%	2.9
Credit Union	32%	1.3%	£2,900	1%	3.3
Car	9%	14.1%	£5,200	10%	2.9
Mail Order	35%	16.3%	£500	7%	3.5
Home Credit	250%	1.5%	£950	1%	3.4
Pay Day Loan	300%	1.6%	£470	1%	5.6

Table 4:
Summary Statistics for Responses to Financial Literacy Questions (Portfolio Sample)

<i>Panel A: Distribution of Responses by Question</i>					
Simple Interest	£850	£1000	£1150	£1500	Do not know
	1.4%	0.1%	84.3% <i>correct</i>	8.3%	5.9%
Compound Interest	<5 years	5–10 years	>10 years	Do not know	
	52.1% <i>correct</i>	30.4%	5.7%	11.8%	
Minimum Payment	<5 years	5–10 years	>10 years	Never	Do not know
	3.6%	18.5%	17.9%	42.2% <i>correct</i>	17.7%
<i>Panel B: Distribution of Correct Responses by Total Questions Answered Correctly</i>					
Total Number of Questions Answered Correctly	Proportion of Sample	Simple Interest	Compound Interest	Minimum Payment	
0	11.0%	0%	0%	0%	
1	29.2%	86.7%	8.8%	4.4%	
2	30.0%	97.2%	65.6%	37.1%	
3	29.8%	100%	100%	100%	

Table 5:
Financial Literacy Scores and Consumer Credit Portfolios

	Financial Literacy Score			
	0	1	2	3
N	94	249	256	254
<i>Employment and Education</i>				
Employed	0.56	0.67	0.69	0.78
Unemployed	0.03	0.02	0.05	0.04
Retired	0.17	0.11	0.11	0.06
Spouse Employed	0.41	0.46	0.46	0.52
Spouse Retired	0.12	0.09	0.10	0.06
Age Left Full-Time Education	17.8	17.9	18.7	19.4
<i>Housing Tenure</i>				
Outright Owner	0.14	0.18	0.12	0.11
Mortgaged Owner	0.39	0.36	0.46	0.56
Private Renter	0.14	0.22	0.22	0.20
Social Renter	0.24	0.15	0.11	0.05
<i>Gross Household Income</i>	£32,000	£33,500	£37,500	£43,500
<i>Consumer Credit</i>	£4,500	£5,600	£6,400	£7,600
<i>Consumer Credit as % Income</i>	0.17	0.20	0.22	0.24
<i>Weighted Average APR</i>	23%	21%	18%	14%
<i>Portfolio Share High Cost Credit</i>	38%	25%	12%	5%

Table 6
Regression Estimates: Portfolio Weighted APR

	1. OLS	2. OLS
Financial Literacy Score (0-3)	-1.76** (0.41)	-
Simple Interest	-	-0.71 (2.77)
Compound Interest	-	0.19 (2.10)
Minimum Payments	-	-4.36** (1.10)
Age 18-24	-6.24 (4.59)	-6.06 (4.59)
Age 25-34	-5.87* (2.81)	-5.68* (2.82)
Age 45-54	-2.25 (2.93)	-2.30 (2.93)
Age 55+	-5.07 (3.47)	-5.19 (3.46)
Spouse Employed	-5.41 (3.23)	-5.19 (3.23)
Income (£0,000)	-0.81* (0.40)	-0.82* (0.40)
Owner (outright)	-13.09** (2.48)	-13.06** (4.28)
Owner (mortgage)	-10.47** (3.54)	-10.37** (3.55)
Private renter	-8.75** (3.17)	-8.63** (3.17)
N	853	853
R-squared	0.037	0.064

*Notes: *denotes significance at 5% level, ** denotes significance at 1% level. Dependent variable is weighted average portfolio APR. Age group 35-44 omitted. Additional control variables: household income squared, household income cubed, 1/0 indicator variables for male respondent, ethnic minority respondent, employed, retired, spouse retired, educational attainment (years in full time education, years in full time education squared), value of mortgage, value of home, marital status of respondent, number of children in family unit.*

Table 7
Regression Estimates: High Cost Credit Share

	1. OLS	2. OLS	3. Tobit	4. Tobit
Financial Literacy Score	-0.05** (0.01)	-	-0.15** (0.04)	-
Simple Interest	-	-0.06* (0.03)		-0.10 (0.10)
Compound Interest	-	-0.03 (0.03)	-	-0.10 (0.07)
Minimum Payments	-	-0.06** (0.02)	-	-0.24** (0.08)
Age 18-24	-0.06 (0.06)	-0.06 (0.06)	-0.36* (0.17)	-0.35* (0.17)
Age 25-34	-0.02 (0.03)	-0.02 (0.03)	-0.19 (0.10)	-0.18 (0.10)
Age 45-54	0.04 (0.04)	0.04 (0.04)	0.07 (0.10)	0.07 (0.10)
Age 55+	-0.02 (0.04)	-0.02 (0.04)	-0.15 (0.12)	-0.16 (0.12)
Spouse Employed	-0.02 (0.04)	-0.02 (0.04)	-0.02 (0.11)	-0.01 (0.11)
Income (£0,000)	-0.01* (0.01)	-0.01* (0.01)	-0.05** (0.02)	-0.05** (0.02)
Owner (outright)	-0.07 (0.05)	-0.06 (0.05)	-0.18 (0.14)	-0.18 (0.14)
Owner (mortgage)	-0.08 (0.04)	-0.08 (0.04)	-0.24* (0.12)	-0.23* (0.12)
Private renter	-0.07 (0.04)	-0.07 (0.04)	-0.29** (0.11)	-0.29** (0.11)
N	853	853	853	853
R-squared	0.09	0.10	0.09	0.10

*Notes: *denotes significance at 5% level, ** denotes significance at 1% level. Dependent variable is weighted average portfolio APR. Age group 35-44 omitted. Additional control variables: household income squared, household income cubed, 1/0 indicator variables for male respondent, ethnic minority respondent, employed, retired, spouse retired, educational attainment (years in full time education, years in full time education squared), value of mortgage, value of home, marital status of respondent, number of children in family unit.*

Table 8:
Financial Literacy Scores and Financial Literacy Behaviours

	Financial Literacy Score			
	0	1	2	3
N	94	249	256	254
<i>Finds Finance Confusing (0-1)</i>	0.43	0.51	0.40	0.26
<i>Financial Confidence (0-7)</i>	3.13	4.47	5.13	6.14
<i>Reads Financial Press (0-1)</i>	0.19	0.22	0.39	0.62

Table 9
Regression Estimates: Financial Literacy Behaviours

	1. Confused about Finance Probit	2. Confused about Finance Probit	3. Confident in Credit Decisions OLS	4. Confident in Credit Decisions OLS	5. Reads Finance Probit	6. Reads Finance Probit
Financial Literacy Score	-0.17** (0.05) [-0.06]	-	0.47* (0.06)	-	0.07** (0.02) [0.02]	-
Simple Interest	-	0.13 (0.13) [0.05]	-	0.35* (0.16)	-	-0.05 (0.14) [-0.02]
Compound Interest	-	-0.35** (0.10) [-0.13]	-	0.49** (0.12)	-	0.04* (0.02) [0.01]
Minimum Payments	-	-0.17 (0.10) [-0.06]	-	0.54** (0.12)	-	0.17** (0.05) [0.50]
N	853	853	853	853	853	853
R-squared	0.05	0.06	0.15	0.15	0.09	0.09
Baseline Prob.	0.38	0.38	4.89	4.89	0.25	0.25

*Notes: *denotes significance at 5% level, ** denotes significance at 1% level. Age group 35-44 omitted. Additional control variables: household income squared, household income cubed, 1/0 indicator variables for male respondent, ethnic minority respondent, employed, retired, spouse retired, educational attainment (years in full time education, years in full time education squared), value of mortgage, value of home, marital status of respondent, number of children in family unit.*