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**Self-Control, Financial Literacy and
Consumer Over-Indebtedness**

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SELF-CONTROL, FINANCIAL LITERACY AND CONSUMER OVER-INDEBTEDNESS

by

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Abstract

This paper examines the relationship between self-control, financial literacy and over-indebtedness on consumer credit debt among UK consumer. Lack of self-control and financial illiteracy are positively associated with non-payment of consumer credit and self-reported excessive financial burdens of debt. Consumers who exhibit self-control problems are shown to make greater use of quick-access but high cost credit items such as store cards and payday loans. We also find consumers with self-control problems are more likely to suffer income shocks, credit withdrawals and unforeseen expenses on durables, suggesting that lack of self-control increases exposure to a variety of risks. In most specifications we find a stronger role for lack of self-control than for financial illiteracy in explaining consumer over-indebtedness. We discuss the policy implications of these findings.

JEL classification: D03 D12 E21

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1. Introduction

Recent research in the field of consumer finance has focused on understanding the role of biases in consumer decision making and behaviour in explaining participation in financial markets and consumer financial performance. One strand of this literature focuses on consumer understanding of financial concepts and ability to correctly interpret financial data, commonly referred to as financial literacy. Empirical studies show limited participation in the stock market and financial preparation for retirement are associated with lower levels of financial literacy (Bernheim 1995, 1998; Banks et al, 2010; Clark et al., 2011; Guiso and Jappelli, 2009; Hastings et al., 2011; Yoong, 2011; Lusardi and Mitchell, 2007; Van Rooji et al, 2011a; Van Rooji et al, 2011b; McHugh et al, 2011). More generally, levels of financial literacy across populations appear low (Hoelzl and Kapetyn, 2011; Lusardi, 2008; Lusardi and Mitchell, 2008; Jappelli, 2010).

A separate strand focuses on behavioural biases such as high levels of impatience or lack of self-control. Theoretical papers have characterised self-control as an intrapersonal decision time-inconsistency problem, a conflict between ‘multiple selves’ or as cue-triggered mistakes, among others. (Strotz, 1956; Thaler and Shefrin, 1981; Bernheim and Rangel, 2004; Benhabib and Bisin, 2005; Kim, 2006). Empirical studies on measuring self-control problems among individuals have found a negative relationship between self-control and the accumulation of wealth (Ameriks et al, 2003; Ameriks et al, 2007).

The concepts of financial literacy and self-control would also seem very relevant for consumer use of consumer credit and, more particularly, consumer over-indebtedness. Studies in the theoretical literature have commonly cited self-control problems as a possible explanation for high levels of credit card borrowing (Laibson, 1997; Fehr, 2002; Heidhues and Koszegi, 2010). Recent models of self-control in consumer credit markets show that

many features of consumer credit contracts are at least consistent with time inconsistent preferences on the part of consumers (Heidhues and Koszegi, 2010; Laibson, Repetto and Tobacman, 2011).

In this paper we empirically examine how financial literacy and self-control relate with consumer over-indebtedness. Existing studies have shown that these concepts are relevant for understanding consumer credit use. There is evidence that consumers over borrow on consumer credit products which incorporate ‘teaser rates’, a pattern in behaviour consistent with time inconsistent choices (Shui and Ausubel, 2004; Ausubel, 1999). Also, a recent paper by Meier and Sprenger (2009) finds a positive relationship between high levels of impatience and credit card use. Lusardi and Tufano (2009) show that low levels of financial literacy among consumer credit users is associated with use of high cost credit. In contrast, we focus on the adverse outcomes of consumer over-indebtedness as measured by arrears and/or payment problems on outstanding debt.

This is a particularly apposite topic on which to bring to bear these concepts. Consumer credit is characterised by being readily available, high cost compared with alternative borrowing options and potentially accruing arrears quickly. The costs of sub-optimal market participation are potentially very high. Rational participation in consumer credit markets requires consumer understanding of financial concepts such as annualised percentage rates¹, interest compounding and contractual payment obligations. Prudent use of consumer credit – so called because of its associated with the purchase of consumption goods – further requires self-control and financial organisation. The natural implication of lacking either of these is a higher chance of running to debt problems, but the mechanisms for such debt problems differ in each case.

¹ Under the U.K. Consumer Credit Act, lenders must display the APR at least as prominently as any other rate of charge on loan advertisements. Similar provisions exist in the U.S. under the Truth in Lending Act.

We use household survey data drawing on detailed data consumer credit market participation, portfolios and payment problems for a representative sample of UK consumers². We relate these data to survey questions which measure financial literacy and self-control³. The UK is a particularly interesting context for our study: it has the second largest level of non-mortgage household debt (hereafter labelled ‘consumer debt’) in the world, after the United States, valued at the end of 2010 at close to £200bn. Moreover, outstanding consumer debt as a proportion of household income has increased consistently since the mid-1990s. The U.K. consumer credit market is one of the least regulated in the world, and has seen the advent of new forms of sub-prime credit, such as store card credit, payday lending, home credit and ‘instant access instalment credit’.

We make the following new contributions. Firstly, we find that over-indebtedness, measured both as delinquency on repayments and self-reported financial distress, occur disproportionately among individuals who report a self-control problem, approximately 10% of our sample. We also find a positive relationship between financial illiteracy and over-indebtedness. In contrast, heavily discounting the future or being confused about financial products are both statistically insignificant in our estimates.

Secondly, we examine the relationship between self-control and credit product use and show that individuals with self-control problems make disproportionate use of quick-

² We use self-reported data on delinquency and non-payment on consumer credit products. Studies based on household data using North American samples (the SCF, in Zinman, 2009) and South African samples (Karlán and Zinman, 2008) suggest consumers typically under-report their level of debt. However, we find in our sample that there does not appear to be an under-reporting problem with consumer credit delinquency. The 3-month delinquency rate on a broad range of consumer credit products self-reported by individuals in our sample corresponds closely with industry estimates.

³ The rationale for the latter is that the concept of self-control, integrated into by various means into the theoretical self-control frameworks in the literature (In particular, the models of Strotz (1956). Thaler and Shefrin (1981), Laibson (1997), Gul and Pesendorfer (2001), Bernheim and Rangel (2004), Fudenberg and Levine (2004) and Benhabib and Bisen (2005), readily translates into a core concept – impulsiveness - which can be elucidated in what has been described as ‘natural language’ (Ameriks et al, 2007) and so is appropriate for elicitation via direct survey questions. We choose this approach over asking participants in our survey to undertake a choice task due to the inherent difficulties in eliciting reliable measures of time preference in experimental choice settings arising from the impact of extra-experimental borrowing and lending opportunities, on which see Coller and Williams (1999), Harrison et al. (2002), (2005), Cubitt and Read (2007).

access credit products which facilitate impulse-driven purchases: such individuals would benefit from restricted access to such products.

Thirdly, when we condition our models on recent financial shocks experienced by the household, we find that the coefficients on both our self-control and financial literacy variables diminish in their magnitude and statistical significance. This implies that individuals with self-control problems and poor financial literacy are also more likely to suffer adverse financial shocks and suggests that self-control problems might permeate other dimensions of economic choice which pertain to over-indebtedness, apart from consumption / saving / borrowing decisions.

Our results contribute to the empirical literature on consumer finance by demonstrating that behavioural characteristics of consumers have non-negligible impacts on use and mis-use of consumer credit, choice of credit products, but also correlate with income / expenditure shocks. These results contribute to the understanding of consumer behaviour in consumer credit markets (Agarwal et al, 2006; Campbell, 2006; Agarwal et al, 2009; Gabaix and Laibson, 2006; Jappelli and Padula, 2011; Lusardi and Tufano, 2009; Tufano, 2009; Stango and Zinman, 2009; Stango and Zinman, 2011; Vissing-Jorgensen, 2011; Kapetyn and Teppa, 2011, Hoesl et al., 2011) as well as providing further insight into the drivers of over-indebtedness in the U.K. context (Bridges and Disney, 2004; Bridges et al. 2008.)

2. Survey Design and Data

To implement the survey we partnered with the market research company YouGov, integrating our survey questions into their consumer-credit focused DebtTrack survey. The DebtTrack survey is a quarterly repeated cross-section survey of a representative sample of U.K. households covering approximately 3,000 households which is conducted via the

internet⁴. For a fee, researchers can add questions to the core survey question modules, and we exploit this provision for our research design. In this section we first describe the survey and provide summary statistics, then introduce our survey questions on self-control and other behavioural traits, and then describe our financial literacy questions.

2.1 Survey and sample characteristics

The core survey is comprised of approximately 85 questions covering household demographics, labour market information, income and balance sheet details. The consumer credit data is particularly detailed: respondents are asked to provide details about the number and type of consumer credit products they hold (selecting product types from an exhaustive drop-down menu of types), outstanding balances for each item (excluding transactions balances on, for example, credit cards), monthly payments, whether they are 1 month in arrears on the product, whether they are 3 months in arrears on the product, and the value of arrears. The monthly payment question refers to the regular monthly payment or, in the case of credit products without a regular monthly payment (such as credit cards), the payment made in the last month.

Summary statistics for the survey sample are provided in Table 1. The whole sample is comprised of 3,041 households⁵. For our analysis we use only households with a positive balance on at least one consumer credit item and this provides a sample size of 1,234 households. Comparing the analysis sample with the whole sample, households in the analysis sample are typically younger, more likely to be employed and are more likely to have families. Financial characteristics of the analysis sample are shown in Table 2. Mean

⁴ We incorporated our questions into the September 2010 wave of the internet survey. There is evidence to suggest that internet-based surveys generate less bias in responses compared with using telephone surveys (Chang and Krosnick, 2008)

⁵ Household characteristics in the whole sample match closely those in other household surveys which contain information on household credit and debt, including financial characteristics. Further details on data quality, which we judge to be high, are available in an earlier paper (Disney and Gathergood, 2011).

total unsecured debt is £7,400. Data on consumer credit holdings show that the majority of households hold at least one credit card and have access to at least one bank overdraft. Approximately one quarter of the analysis sample have at least one personal loan. Around one-fifth hold a store card, with slightly lower proportions for car loans and mail order catalogues.

2.2 Measures of Over-Indebtedness

We next turn to our measures of over-indebtedness. We choose to focus on indicators of over-indebtedness which measure delinquency on debt⁶. Indicators of delinquency-based measures of over-indebtedness among respondents are provided in Table 3. Three measures of over-indebtedness are presented: one month delinquency on at least one credit item, three month delinquency on at least one credit item and a measure of self-reported over-indebtedness based on delinquency coupled with self-reports of ‘real financial problems’⁷. Using this approach we are able to exploit both an objective measure (delinquency) and a subjective measure (‘real financial problems’). In our sample, 17.5% of households (216 observations) report being at least one-month delinquent on at least one credit product, 10% of households (124 observations) report being at least three-months delinquent on at least one

⁶ While over-indebtedness can undoubtedly occur without delinquency – individuals might have too much debt relative to their optimal level of borrowing but nevertheless find themselves able and willing to service the cost of their debt and maintain their contractual payments – forming measures of over-indebtedness based on debt burdens alone is problematic. For example, high debt-to-income ratios might be taken as indicative of over-indebtedness. However, households expecting high future income growth might optimally hold high levels of debt relative to their income. Indeed, ‘official’ measures of over-indebtedness based on debt multiples, number of credit items held or income gearing can be potentially misleading by overstating levels of over-indebtedness. Bridges, Disney and Gathergood (2008) show that by official U.K. measures of ‘over-indebtedness’ based on such criteria, over 30% of U.K. mortgage holders and 50% of U.K. unsecured credit holders would be considered to be over-indebted.

⁷ ‘Delinquency’ in our data refers to a missed minimum payment on a credit/store card, or a missed contractual payment on a repayment loan. So our delinquency measure does not take into account any payment behaviour on bank overdrafts (unless the household has a repayment schedule agreed with their bank to resolve the overdraft debt).

credit product. The 10% figure for three-month delinquency closely matches industry statistics on delinquency rates for consumer credit⁸.

The self-reported measure of over-indebtedness is constructed from the following question, asked of all respondents in our analysis sample⁹:

A. 'Which of the following statements best describes how well you [and your partner] are keeping up with your credit commitments at the moment?'

- 1. I am/we are keeping up with all bills and commitments without any difficulties*
- 2. I am/we are keeping up with all bills and commitments, but it is a struggle from time to time*
- 3. I am/we are keeping all bills and commitments, but it is a constant struggle*
- 4. I am/we are falling behind with some bills or credit commitments*
- 5. I am/we are having real financial problems and have fallen behind with many bills or credit commitments*
- 6. I/we don't have any bills or credit commitments*
- 7. Don't know*

From the responses to this question we identify self-reported over-indebted households as those for which the respondent choose Statement 5. In our analysis sample 8.5% of households (102 observations) chose statement 5. Taking these measures together, fewer households report they are facing 'real financial problems' as well as delinquency (8.3% of the sample) compared with the number of households reporting one-month or three-month delinquency (17.5% and 10% respectively). Overall, 19% (234 households) of households in

⁸ There are no official published statistics on consumer credit delinquency rates in the U.K. The Bank of England publishes data on outstanding consumer credit and credit written-off. The Finance and Leasing Association, the industry body for the consumer credit industry, does not publish data on the loan books of its members. However, Moody's rating agency does provide data on 3-month consumer credit delinquency rates among U.K. lenders as part of its 'Consumer Credit Index'. In September 2009 (the month of our survey) Moody's reported an average 3-month consumer credit delinquency rate for the U.K. of 9.7%.

⁹ This question, together with the questions on behavioural traits were asked early-on in the survey module following the introductory section on demographics/characteristics and prior to the section on home ownership status and mortgage / rent details. This question was asked after the questions on behavioural traits.

the analysis sample can be classified as over-indebted by at least one of the over-indebtedness measures we use¹⁰.

2.3 Measures of behavioural characteristics

To measure the proportion of households with self-control problems, households who heavily discount future consumption and are financial disorganised in the analysis sample we employ a survey instrument whereby households are asked to identify the extent to which their behaviour corresponds that described in a short statement. Existing studies in the economics literature provide evidence that individuals are willing and able to self-identify their sub-optimal behavioural traits and provide meaningful responses which explain economic outcomes. Ameriks et al. (2003) use a series of statements relating to financial planning activity, which also include examples where individuals are asked to associate themselves with stated behaviours which might be perceived as sub-optimal, such as failure to produce a plan. A similar approach is used in Ameriks et al. (2007).

The statements we use refer specifically to individual behaviour with regard to financial choices, rather than more general behaviours¹¹. The statements used were as follows:

- i) 'I am impulsive and tend to buy things even when I can't really afford them'*

- ii) 'I am prepared to spend now and let the future take care of itself'*

¹⁰ This implies there are a small group of households (1.5% of the analysis sample) who chose Statement 5 from the indebtedness question but did not identify any credit commitment on which they were at least on month delinquent in the module on their credit commitments, which reflects a small degree of inconsistency in respondent reports of credit delinquency within the survey.

¹¹ We are confident that the behaviours described in the statements are accurate translations of the behaviours encapsulated in models of self-control and in the concepts of time discounting and financial sophistication. The statement on impulsive behaviour refers specifically to purchases which the individual has some sense is unaffordable to them but are motivated by impulsiveness. The statement is neither too general (for example, referring to impulsive behaviour across an unspecified domain) not too particular (for example, specifying a particular type or context for spending). Similarly, the 'heavy discounter' statement captures the concept of a strong present time preference for consumption. It specifically refers to expenditure and refers to ideal time patterns of expenditure which the individual would actually want to implement 'am prepared'. The third statement, the most straightforward of the three, captures general confusion on the part of the respondent with regard to financial services.

iii) 'Financial services are complicated and confusing to me'

together with the following options, from which respondents could choose one:

a) Agree strongly b) Tend to agree c) Neither agree nor disagree

d) Tend to disagree e) Disagree strongly f) Don't know.

We label these the 'impulsiveness' statement, the 'heavy discounter' statement and the 'confused about finance' statement respectively. The proportion of households who positively identify themselves as being 'impulsive' by this measure in our analysis sample conforms to the proportion of individuals who are identified as having self-control problems by other elicitation methods in other studies. In the analysis sample 9.2% of respondents agree strongly or tend to agree with the impulsiveness statement. In Ameriks et al (2007) 11.2% of their sample report a present bias in their expected compared with ideal time allocation of restaurant vouchers, though their sample is comprised of high-wealth individuals.

2.4 Measure of financial literacy

Our measure of financial literacy is comprised of three survey questions derived from the financial literacy literature. In Lusardi (2008), 'core' financial literacy is comprised of the three concepts of interest compounding, real vs nominal returns and portfolio diversification. However, in the context of overindebtedness the latter two are not relevant, so instead we choose to introduce financial literacy questions which are pertinent to individuals in debt. The questions and responses among our sample are provided in Table 5.

A little fewer than 85% of respondents answered the first question on interest compounding correctly, slightly fewer than 54% answered the interest compounding question correctly and a little more than 43% answered the monthly payments question correctly. What is clear among respondents in our sample is that a significant proportion of individuals

with outstanding consumer credit debts do not answer these questions about the cost of consumer credit correctly. Only a little more than 31% of respondents answered all three questions correctly, with a little over 40% answering only one or fewer of the questions correctly.

2.5 Characteristics of Over-Indebted and Non-Over Indebted Households

From Table 6, based on observed characteristics, over-indebtedness is more common among households with respondents who are younger, unmarried with children, with less education, lower rates of employment and higher rates of unemployment, lower rates of outright homeownership and higher rates of private and social renting (especially social renting). Over-indebted households typically have annual incomes of £10,000 less than non over-indebted households and unsecured debts equivalent to one third of their annual income (compared with one-seventh for non over-indebted households).

In terms of the behavioural characteristics of households in our sample, we compare these by creating a series of 1/0 indicator dummy variables for whether the household is financial literate, confused by finance, a heavy discounter or an impulsive spender¹². By these measures, over-indebted households in our sample are one third less likely to be financially literate, one quarter more likely to be confused by financial, half more likely to be a heavy discounter and more than twice as likely to be impulsive spenders compared with non-over indebted households. These summary statistics demonstrate that over-indebted households contrast with non over-indebted households by a range of demographic, financial and behavioural characteristics.

3. Econometric Model and Estimation

¹² These are constructed as follows: the financially literate dummy takes a value of 1 if the respondent answered at least two of the financial literacy questions correctly and a value of 0 otherwise; the other three dummies take a value of 1 if the respondent answered 'agree strongly' or 'tend to agree' and a value of 0 otherwise.

Next we seek to model the relationship between these demographic, financial and behavioural characteristics and over-indebtedness. The econometric model to be estimated is:

$$od = \alpha_0 + \alpha_1 fl + \alpha_2 cf + \alpha_3 hd + \alpha_4 is + \alpha_5' z + \varepsilon \quad (1)$$

Where *od* is a 1/0 dummy indicator of over-indebtedness; *fl*, *cf*, *hd* and *is* are the 1/0 dummy indicator variables for financially literate, confused by finance, heavy discounter and impulsive spender respectively, *z* is a vector of controls including demographic, financial and economic variables and ε is an error term. We estimate Equation 1 using a Probit model. We estimate the model separately using the three indicators of over-indebtedness in our data.

Table 8 presents results. In Column 1 the indicator variables for financially literate and impulsive spender have a positive signs and are statistically significant at the 5% level. The baseline predicted probability for the dependent variable is 0.14. The marginal effects of imply that an impulsive spender is approximately 70% more likely to be one month delinquent and a financially literate consumer is 40% less likely to be one month delinquent. Columns 2 and 3 present estimates for the two other indicators of over-indebtedness. In both cases the coefficient on the impulsive spender variable remains statistically significant at the 1% level with a marginal effect implying a similar magnitude to that found in Column 1. However, in these specifications the coefficient on the financial literacy measure is not statistically significant. These results imply variation in individual impulsiveness across individuals in the sample explains over-indebtedness more so than variation in levels of financial literacy

Why do we find this relationship between literacy, impulsiveness and over-indebtedness? In particular, why do we find the strong relationship between impulsiveness and problem debt? One possibility is that individuals who act impulsively in their spending decisions use forms of consumer credit which make them more vulnerable to incurring debt

problems. As we suggested in the introduction, different forms of consumer credit present greater or lesser opportunities to facilitate impulse-driven purchases.

The equation to be estimated is now

$$p = \alpha_0 + \alpha_1 fl + \alpha_2 cf + \alpha_3 hd + \alpha_4 is + \alpha_5' z + \varepsilon \quad (2)$$

Where p is a 1/0 dummy indicator value for whether the individual holds a positive balance on at least one consumer credit product of a particular type. In our data the product types which enter as ' p ' in our estimates are: credit card, overdraft, personal loan, store card, car loan, mail order catalogue, hire purchase, home credit, pay day loan, credit union loan. Equation (2) is estimated in each case using a Probit model. Results are presented in Table 7.

Results show the impulsive spender dummy is statistically significant with a positive coefficient in models for those types of credit products which most embody the characteristics of facilitating rash spending: store cards, mail order catalogues, home credit and pay day loans. These product types have in common the features of being readily available at the point of purchase of a good which is advertised in conjunction with the availability of the credit facility, so allowing consumers drawn to impulsive spending to access near-instant credit to facilitate that spending¹³. They are also higher-cost products. The marginal effects of the coefficients in each case imply that individuals who are impulsive spenders are, in all cases, at least twice as likely to use such products. Results also suggest that more literate individuals are more likely to use students loans and less likely to use mail order catalogues or credit union loans.

¹³ To be specific: store cards facilitate impulse spending by being advertised and available at store checkouts, with applications approved while the customer queues for purchase and credit available within a few minutes; mail order catalogues are designed for consumers to order purchases from the catalogue on finance; home credit (or doorstep credit) providers offer cash transfers to individuals on their doorstep and make loan decisions in a short space of time at the doorstep; pay day lenders (high-street lenders) clear cash transfers in minutes and make funds available to the shopper on the high street. Maybe it is therefore unsurprising that impulsive spenders are shown to be more likely to use such forms of credit.

These results suggest the relationship between impulse spending and over-indebtedness is at least in part mediated through the types of consumer credit used by impulsive spenders and the contexts for their credit use which particular product types allow. Of course, not all consumers who use these particular product types exhibit over-indebtedness, but our results show that impulsive behaviour which is associated with over-indebtedness is also associated with greater use of these forms of credit.

A second possible explanation for the relationship between impulsive spending behaviour and over-indebtedness is that households who are impulsive in their spending might also be impulsive in other dimensions of their behaviour (such as in the labour market or goods market) such that they are more exposed to income shocks or unforeseen expenditures¹⁴. To incorporate financial shocks into our model of over-indebtedness we introduce measures of four categories of the most relevant forms of financial shocks: job loss, income fall, credit withdrawal and a major expense. These measures are derived from a series of questions included in the survey on the recent experience of respondents in these areas¹⁵. Table 9 compares the prevalence of financial shocks among over-indebted and non over-indebted households. The data show over-indebted households were more likely to have experienced each type of shock, being (approximately) four times as likely to have

¹⁴ Della Vigna and Paserman (2005) show that individuals who are more impatient engage in lower quality job search in the labour market compared with more patient individuals, suggesting individuals with impulsive tendencies might engage in suboptimal behaviour in a wider range of domains than just consumption choice (Della Vigna, 2009; Della Vigna and Malmenider, 2004). Such outcomes might arise due to, for example, lower quality job matches resulting in greater likelihood of redundancy or income falls. Similarly, impulsiveness might lead to lower quality product search in goods markets and lead to agents being more exposed to expenditure shocks arising from good failing or requiring replacement. This might be particularly relevant for durable goods, which requires patience as the utility flow is realised over a period of time.

¹⁵ In the case of job loss, respondents are asked whether they have recently experienced redundancy (with or without a severance payment), their partner recently experienced redundancy (with or without a severance payment), or ended work due to illness. In the case of income fall respondents are asked whether they have recently experienced a 'significant fall' in their income, or their partner's income. For credit withdrawal respondents are asked whether they have recently had their credit card withdrawn, credit limit reduced on their credit card or an overdraft facility withdrawn. For major expenses, respondents are asked whether they have recently incurred house repairs, replacement of a major household item due to failure or car repairs. For each case the 'recent' period under consideration is set at the previous 6 months. Respondents are asked to provide a yes/no response to each question.

experienced job loss, twice as likely to have experienced a fall in income, four times as likely to have experienced credit withdrawal and one quarter more likely to have experienced a major expense.

The revised version of the empirical model to be estimated is therefore:

$$od = \alpha_0 + \alpha_1 fl + \alpha_2 cf + \alpha_3 hd + \alpha_4 is + \alpha_5 jl + \alpha_6 if + \alpha_7 cw + \alpha_8 me + \alpha_9' z + \varepsilon \quad (3)$$

Where the variables *jl*, *if*, *cw* and *me* are a series of 1/0 dummy variables which take the value of 1 if the household reports experiencing that financial shock in the previous six months and a value of 0 otherwise. Results are presented in Table 9. In all of the specifications the income fall and credit withdrawn variables are positive and significant at the 5% level or lower. The marginal effects on these coefficients imply large effects of financial shocks on the likelihood of over-indebtedness. The coefficient on the impulsive spender dummy becomes statistically insignificant in Columns 1 and 2, though remains statistically significant at the 1% level in Column 3. Hence the relationship between impulsive spending behaviour and over-indebtedness appears in part explained by the tendency for individuals who identify themselves as impulsive spenders to also more commonly report experiencing a financial shock compared with individuals who do not report they are impulsive spenders.

Conclusion

This study has examined the relationship between self-control, financial literacy and over-indebtedness using survey data from a representative sample of U.K. households with consumer credit debts. Measures of individual time preference, impulsiveness, and understanding finance plus results from financial literacy survey questions were examined in relation to delinquency on consumer credit payments and self-reported consumer credit

repayment problems. In our sample a subset of households exhibited a tendency towards impulsive spending and heavily discounting future consumption. Levels of financial literacy were found to be higher than those recorded in studies based on samples of consumer from the U.S., but nevertheless low in absolute terms and two-fifths of our sample reported being confused by finance.

We find that poor financial literacy and self-control problems are both positively associated with over-indebtdness. There is stronger evidence for a role for self-control problems, our measure of self-control is more significant in statistical terms and implies stronger economic effects in all specifications. Our extensions also shed light on why consumers with self-control problems are more likely to become over-indebted: such consumers make more use of high-cost credit (in particular forms of high-cost credit accessible at short notice and/or at the point of sale) and tend to also be more exposed to financial shocks.

These results are important for three reasons. Firstly, they show that consumer behavioural traits are important for explaining consumer over-indebtedness. The literatures of financial literacy and self-control have sought to find examples of how these tenets of consumer behaviour can be found to explain economic outcomes. We have shown that the empirical relevance of this literature, which has focused on the accrual of wealth and retirement saving, also extends to the issue of consumer over-indebtedness.

Secondly, our results for the relationship between self-control and over-indebtedness suggest that consumers might benefit from less access to credit. One might argue that poor financial literacy and poor self-control imply different remedies: whereas financial literacy might be improved through financial education, individuals cannot be educated on self-control. This raises the prospect that individual choices need to be restricted so as to prevent

individuals from engaging in sub-optimal behaviour. In the context of the consumer credit market, there may be an argument for restricting credit available at the point-of-sale or delaying access to funds so as to mitigate consumer self-control problems.

Finally, our results on the relationship between self-control and financial shocks suggest that individuals with self-control problems have higher exposure to adverse events, possibly due to their impulsive behaviour resulting to sub-optimal outcomes in other dimensions of individual choice apart from intertemporal consumption/saving decisions. Relatively little research exists of impulsive outside of the context of intertemporal consumption choice. However, one might think that self-control problems are relevant in a broad range of choice settings relating to consumption insurance, the composition of consumption (purchase of durables and repairs), search in product markets, and activity in labour markets. Our findings suggest the interplay between different dimensions of individual self-control behaviour might be important for explaining economic outcomes.

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TABLE 1
Demographic Characteristics of Survey Respondents

	Whole Sample		Analysis Sample	
	(n)	(%)	(n)	(%)
Sample Size	3,041	100	1,234	100
Age				
18 – 25	275	9.0	110	8.9
26 – 35	588	19.3	332	26.9
36 – 45	565	18.6	262	21.2
46 – 55	534	17.6	239	19.4
Over 55	1,079	35.5	291	23.6
Gender				
Female	1,507	49.6	669	54.2
Male	1,534	50.4	565	45.8
Marital status				
Married	1,980	65.1	385	68.8
Unmarried / divorced	1,061	34.9	849	31.2
Education leaving age				
16 or under	988	32.5	383	31.0
17 – 19	770	25.3	312	25.3
over 20	1,283	42.2	539	43.7
Employment status				
Employed or self-employed	1,729	56.7	814	66.0
Unemployed	132	4.3	53	4.3
Retired	602	19.8	124	10.0
Out of the labour force	578	19.0	243	19.7
Spouse employed	1,250	41.1	614	50.2
Spouse not employed	1,791	58.9	620	49.8
Dependent Children				
Has dependent children	578	19.0	915	74.2
No dependent children	2,463	81.0	319	25.8
Homeownership Status				
Homeowner without mortgage	862	28.4	185	14.9
Homeowner with mortgage	1,093	35.9	548	44.4
Private renter	507	16.7	265	21.5
Social renter	270	8.9	136	11.0

TABLE 2
Financial Characteristics of Survey Respondents

	n with positive value	% with positive value	£ average among those with positive value
Household finances			
Income	1,234	100	£38,000
Liquid savings	618	50.0	£9,500
Unsecured debt	1,234	100	£7,400
House value	695	46.3	£202,000
Mortgage debt	391	31.7	£76,000
Consumer credit holdings			
Credit card	912	73.9	£4,400
Overdraft	695	56.3	£1,200
Personal loan	328	26.6	£6,700
Store card	224	18.1	£900
Car loan	214	17.3	£5,200
Mail order catalogue	221	17.9	£500
Hire purchase	90	7.3	£3,500
Home credit	20	1.6	£900
Pay day loan	19	1.5	£500
Credit union	18	1.5	£2,900
Over-Indebtedness Indicators			
One-month behind	216	17.5	
Three-months behind	124	10.0	
Self-reported over-indebted	102	8.3	

TABLE 3
Responses to Behavioural Characteristics Statements

	agree strongly	tend to agree	neither agree not disagree	tend to disagree	disagree strongly	don't know
Impulsive spender 'I am impulsive and tend to buy things even when I can't really afford them'	14 (1.1)	100 (8.1)	161 (13.1)	340 (27.6)	596 (48.3)	23 (1.9)
Heavy discounter 'I am prepared to spend now and let the future take care of itself'	19 (1.5)	147 (11.9)	206 (16.7)	382 (31.0)	460 (37.3)	20 (1.6)
Confused by finance 'Financial services are complicated and confusing to me'	111 (9.0)	383 (31.0)	335 (27.2)	274 (22.2)	109 (8.8)	22 (1.8)

TABLE 4
Financial Literacy Question Responses

Simple Interest Question

“Cheryl owes £1,000 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 one year?”

	(n)	(%)
£850	15	1.2
£1,000	3	0.2
£1,150	1,046	84.7
£1,500	98	7.9
Do not know	72	5.8

Interest Compounding Question

“Sarah owes £1,000 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?”

	(n)	(%)
Less than 5 years	663	53.7
Between 5 and 10 years	359	29.1
More than 10 years	69	5.6
Do not know	143	11.6

Monthly Payments Question

“David has a credit card debt of £3,000 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?”

	(n)	(%)
Less than 5 years	47	3.8
Between 5 and 10 years	196	15.9
More than 10 years	232	18.8
None of the above, he will continue to be in debt	534	43.3
Do not know	225	18.2

Total Number of Questions Answered Correctly	(n)	(%)
0	128	10.4
1	357	28.9
2	361	29.3
3	388	31.4

TABLE 5
Demographic, Financial, Literacy and Behavioural Characteristics of
Over-Indebted vs non Over-Indebted

	Unit	Over-Indebted	Non Over-Indebted
Age			
18 – 25	%	6.8	9.4
26 – 35	%	23.9	27.6
36 – 45	%	26.4	20.0
46 – 55	%	21.4	18.9
Over 55	%	21.4	24.1
Male	%	41.9	46.7
Married	%	56.8	71.6
Education leaving age	years	18.1	18.8
Employment status			
Employed or self-employed	%	59.4	67.5
Unemployed	%	8.5	3.3
Retired	%	5.6	11.1
Spouse employed	%	34.6	53.3
Has dependent children	%	33.7	24.0
Homeownership status			
Homeowner without mortgage	%	8.1	15.3
Homeowner with mortgage	%	34.2	46.8
Private renter	%	25.6	20.5
Social renter	%	20.9	8.7
Household finances			
Income	£	29,700	40,000
Unsecured debt	£	10,500	6,600
Behavioural characteristics			
Financially literate	%	48.2	63.6
Confused by finance	%	48.7	38.0
Heavy discounter	%	17.5	12.5
Impulsive spender	%	17.5	7.3

TABLE 6
Baseline Models for Over-Indebtedness

	(1)	(2)	(3)
	One month behind	Three month behind	Self-reported
Financially literate	-0.21* (0.09) [-0.05]	-0.18 (0.11) -0.02	-0.10 (0.12) [-0.01]
Confused by finance	0.13 (0.09) [0.03]	0.01 (0.11) [0.01]	0.10 (0.12) [0.01]
Heavy discounter	0.04 (0.13) [0.01]	-0.05 (0.16) [-0.01]	-0.19 (0.18) [-0.01]
Impulsive spender	0.37** (0.14) [0.10]	0.44** (0.16) [0.07]	0.65** (0.17) [0.04]
Age 18 – 25	-0.59** (0.19) [-0.10]	-0.70** (0.24) [-0.06]	-0.54* (0.26) [-0.01]
Age 26 – 35	-0.18 (0.13) [-0.04]	-0.26 (0.15) [-0.03]	-0.42* (0.18) [-0.01]
Age 46 – 55	-0.02 (0.14) [-0.01]	0.04 (0.16) [0.01]	0.25 (0.17) [0.01]
Age over 55	0.01 (0.16) [0.01]	0.02 (0.19) [0.01]	0.42* (0.19) [0.02]
Unemployed	0.57** (0.19) [0.17]	0.41 (0.22) [0.07]	0.44 (0.23) [0.03]
Spouse employed	-0.41** (0.13) [-0.09]	-0.52** (0.15) [-0.07]	-0.15 (0.18) [-0.01]
Has dependent children	0.48** (0.11) [0.12]	0.45** (0.13) [0.07]	0.25 (0.15) [0.01]
N	1,234	1,234	1,234
R2	0.12	0.15	0.18
LR	139.06	118.65	126.26
Prob>chi2	0.0000	0.0000	0.0000
Baseline pred. prob.	0.14	0.06	0.01

*Notes: *significant at 5% level, **significant at 1% level. Variables also included in models: gender, marital status, education leaving age, homeownership status, value of household income (plus income squared), value of household liquid assets (plus assets squared).*

TABLE 7
Behavioural Characteristics and Credit Product Usage

	(1) Credit Card	(2) Overdraft	(3) Personal Loan	(4) Store Card	(5) Car Loan
Financially literate	0.04 (0.09) [0.01]	0.15 (0.08) [0.06]	0.17* (0.09) [0.05]	-0.04 (0.09) [-0.01]	-0.01 (0.10) [-0.01]
Confused by finance	-0.08 (0.08) [-0.03]	-0.09 (0.08) [-0.03]	-0.04 (0.08) [-0.01]	0.03 (0.09) [0.01]	-0.15 (0.09) [-0.03]
Heavy discounter	0.24 (0.13) [0.07]	0.10 (0.11) [0.04]	-0.04 (0.13) [-0.01]	0.06 (0.13) [0.02]	-0.01 (0.14) [-0.01]
Impulsive spender	-0.15 (0.15) [-0.05]	0.11 (0.14) [0.04]	0.23 (0.15) [0.07]	0.35** (0.15) [0.10]	0.22 (0.16) [0.06]
Demographic controls	Yes	Yes	Yes	Yes	Yes
Financial controls	Yes	Yes	Yes	Yes	Yes
N	1,234	1,234	1,234	1,234	1,234
R2	0.08	0.03	0.08	0.06	0.07
LR	117.53	44.84	107.69	71.35	81.34
Prob>chi2	0.0000	0.0028	0.0000	0.0000	0.0000
Baseline probability	0.75	0.57	0.23	0.17	0.15
	(6) Mail Order Catalogue	(7) Hire Purchase	(8) Home Credit	(9) Pay Day Loan	(10) Credit Union Loan
Financially literate	-0.32** (0.09) [-0.08]	0.03 (0.12) [0.01]	-0.12 (0.25) [-0.01]	-0.07 (0.25) [-0.01]	-1.25** (0.35) [-0.01]
Confused by finance	-0.24* (0.09) [-0.05]	0.07 (0.12) [0.01]	-0.77** (0.29) [-0.03]	-0.02 (0.23) [-0.01]	-0.38 (0.25) [-0.01]
Heavy discounter	0.13 (0.14) [-0.03]	0.09 (0.17) [0.01]	-0.11 (0.39) [-0.01]	0.18 (0.29) [0.01]	-0.30 (0.44) [-0.01]
Impulsive spender	0.50** (0.15) [0.14]	0.21 (0.18) [0.03]	0.66* (0.32) [0.04]	0.65* (0.29) [0.01]	0.29 (0.40) [0.01]
Demographic controls	Yes	Yes	Yes	Yes	Yes
Financial controls	Yes	Yes	Yes	Yes	Yes
N	1,234	1,234	1,234	1,234	1,234
R2	0.14	0.06	0.23	0.28	0.26
LR	156.65	36.13	39.56	53.01	47.16
Prob>chi2	0.0000	0.0294	0.0057	0.0001	0.0006
Baseline probability	0.14	0.06	0.01	0.005	0.008

*Notes: *significant at 5% level, **significant at 1% level. Variables also included in models: gender, marital status, education leaving age, homeownership status, value of household income (plus income squared), value of household liquid assets (plus assets squared).*

TABLE 8
Financial Shocks Among Over-Indebted vs non Over-Indebted

	Unit	Over-Indebted	Non Over-Indebted
Recent shocks			
Job loss	%	24.3	6.4
Income fall	%	38.9	17.5
Credit withdrawn	%	17.5	3.8
Major expense	%	47.9	37.9

TABLE 9
Financial Shocks, Behavioural Characteristics and Over-Indebtedness

	(1)	(2)	(3)
	One month delinquency	Three month delinquency	Self-reported over-indebtedness
Financially literate	-0.19 (0.09) [-0.04]	-0.14 (0.12) [-0.02]	-0.08 (0.13) [-0.01]
Confused by finance	0.07 (0.10) [0.02]	-0.05 (0.11) [-0.01]	0.01 (0.12) [0.01]
Heavy discounter	0.07 (0.14) [0.20]	-0.02 (0.17) [-0.01]	-0.16 (0.18) [0.01]
Impulsive spender	0.16 (0.16) [0.04]	0.26 (0.17) [0.03]	0.49** (0.18) [0.02]
Financial Shocks			
Job loss	0.53** (0.15) [0.14]	0.41* (0.16) [0.06]	0.28 (0.18) [0.01]
Income fall	0.41** (0.11) [0.10]	0.29* (0.13) [0.04]	0.62** (0.14) [0.02]
Credit withdrawn	0.89** (0.17) [0.27]	0.70** (0.18) [0.12]	0.63** (0.19) [0.03]
Major expense	0.27** (0.09) [0.06]	0.25* (0.13) [0.03]	0.12 (0.13) [0.01]
Demographic controls	Yes	Yes	Yes
Financial controls	Yes	Yes	Yes
N	1,234	1,234	1,234
R2	0.20	0.20	0.25
LR	227.63	162.47	172.53
Prob>chi2	0.0000	0.0000	0.0000
Baseline predicted probability	0.13	0.06	0.10

Notes: *significant at 5% level, **significant at 1% level. Variables also included in models: gender, marital status, education leaving age, homeownership status, value of household income (plus income squared), value of household liquid assets (plus assets squared).