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DISSERTAÇÃO

FINANCIAL LITERACY, FINANCIAL BEHAVIOUR AND

OVER-INDEBTEDNESS: A STUDY OF THE FINANCIAL CAPABILITY

SURVEY IN THE UNITED STATES

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Dedico este trabalho ao meu filho, Filipe.

Abstract

This work analyses the impact of financial literacy and financial behaviour of individuals on the likelihood of over-indebtedness, controlling for socioeconomic factors, the type of mortgage and the event of a negative income shock. Using the data from the 2009 National Financial Capability Study of the United States, I consider three self-reported measures of over-indebtedness: financial distress, arrears and foreclosure. A financial literacy index is constructed using questions on the compounding of interest rate, inflation, bonds and stocks, mortgage payment and risk diversification. The financial behaviour index is based on questions concerning individuals' financial choices related with budget management, savings, bank accounts, credit, insurance and financial advice. In addition to the impact of socioeconomic factors, I conclude that financial literacy is important for the prevention of over-indebtedness although financial behaviour emerges as having a stronger impact. I also find that individuals with an adjusted-rate mortgage and the individuals who have experienced a negative income shock are more likely to become over-indebted.

Resumo

Este trabalho analisa o impacto da literacia financeira e do comportamento financeiro dos indivíduos na prevenção de situações de sobre-endividamento, tendo em conta fatores socioeconómicos, o tipo de crédito hipotecário e a ocorrência de uma queda abrupta no rendimento. Utilizando os dados do inquérito à literacia financeira, conduzido nos EUA em 2009, são consideradas três medidas de sobre-endividamento: *stress* financeiro, atraso no pagamento das prestações e execução hipotecária. Com base nas questões sobre juros compostos, inflação, obrigações e ações, reembolso do crédito e diversificação do risco é construído um índice de literacia financeira. Da mesma forma, o índice de comportamento financeiro baseia-se em questões sobre as escolhas financeiras dos indivíduos relacionadas com a gestão do orçamento, poupança, contas bancárias, crédito, seguros e aconselhamento financeiro. Para além do impacto de fatores socioeconómicos, concluo que a literacia financeira é importante para a prevenção do sobre-endividamento, embora o comportamento financeiro dos indivíduos tenha um impacto ainda mais forte. Concluo ainda que os indivíduos que detenham um crédito hipotecário com taxa de juro variável e os indivíduos que tenham sofrido uma forte queda no rendimento têm maior probabilidade de vir a tornar-se sobre-endividados.

JEL Classification: C25, D12, D14

Palavras-chave: Finanças pessoais, Sobre-endividamento, Comportamento financeiro, Literacia financeira.

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Contents

1 Introduction

In the aftermath of the financial crisis, financial literacy has been increasingly recognised as an important individual life skill and has gained prominence in both academic research and policy analysis. The unsustainability of social security systems in many industrialized countries implies a transfer of risk and responsibility from state to individuals in the provision of retirement and health care. The greater complexity of financial products hinders their evaluation and comparison by individuals at a time where their participation in financial markets is increased. In addition, the high expansion of credit preceding the outbreak of the crisis proved to be unsustainable for many people, mainly in the US mortgage credit segment, leading to excessive indebtedness. Currently, many individuals find themselves struggling to keep up with payments because of bad financial choices from taking out mortgages and revolving credit that they could not afford, with terms and conditions that were not fully understood, to spending beyond their means.

These developments have stimulated the research on financial literacy, and on its effects on financial decisions. Most of this research has analysed the impact of financial literacy on savings, retirement planning or portfolio choice. By contrast research on the relationship between financial literacy and over-indebtedness is relatively scarcer. This work contributes to fill this gap by conducting this analysis with a much larger dataset than used in most studies and by considering also the impact of financial behaviour alongside that of the financial knowledge. More concretely, this work identifies the main factors that cause individuals to become over-indebted. In particular, I analyse whether financial literacy, understood as financial knowledge, influences individuals' ability to effectively manage their finances, thereby preventing over-indebtedness. However, making sound financial decisions also depends on the attitudes and behaviours of

individuals. Therefore, I also analyse if the likelihood of becoming over-indebted is determined by individuals' financial behaviour, assessed by the financial choices that individuals make in different contexts such as, saving for retirement, using credit cards or looking for advice.

I use the data from the National Financial Capability Study, carried out in the United States in 2009, to undertake my analysis. The survey was designed to shed light on the causes of the financial crisis looking at the financial capability of individuals measured in terms of how well people make ends meet, plan ahead, choose and manage financial products, and possess the skills and knowledge to make financial decisions. The survey also collected detailed data on socioeconomic characteristics of respondents. I use this rich set of questions to construct a financial literacy index and a financial behaviour index and to assess three levels of over-indebtedness: experiencing financial distress, being in arrears and being involved in a foreclosure procedure. I find that financial literacy positively contributes to the prevention of over-indebtedness. Furthermore, financial behaviour emerges as having a stronger impact than financial literacy on the likelihood of over-indebtedness and the results are statistically significant for the three measures.

This study is structured as follows: in section 2, the existing literature on financial literacy, over-indebtedness and on the relation between financial literacy and individual financial decisions is examined. Section 3 describes the data used and the socioeconomic characteristics of the sample. The model and methodology are presented in section 4 where the construction of the measures for financial literacy, financial behaviour and over-indebtedness are explained in more detail. Section 5 presents the model results and section 6 summarises and concludes.

2   Literature review

2.1   Financial literacy: concept and measurement

Measuring the financial literacy level of the population is important in order to identify potential needs and gaps, as well as identifying groups at risk. Yet, researchers and organizations have defined and measured financial literacy in many different ways. The most cited definition was introduced by Schagen (1997): "*Financial literacy is the ability to make informed judgements and to take effective decisions regarding the use and management of money. Financial literacy is therefore a combination of a person's skills, knowledge, attitudes and ultimately their behaviours in relation to money.*" Since then many conceptualizations have arisen. Based on an extensive review of research studies, Remund (2010) suggest a conceptual definition for financial literacy as "*a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate, short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions*" (ibid. pp. 284). Building on the definition adopted by The President's Advisory Council on Financial Literacy (PACFL (2008)), Hung et al. (2009) define financial literacy as follows: "*knowledge of basic economic and financial concepts, as well as the ability to use that knowledge and other financial skills to manage financial resources effectively for a lifetime of financial well-being*" (ibid. page 12).

From the above definitions it is clear that financial literacy goes beyond financial knowledge. Accordingly, building on the well-known OECD (2005) definition of

"financial education"[1], Atkinson and Messy (2011) define financial literacy as "*a combination of awareness, knowledge, skills, attitude and behaviours necessary to make sound financial decisions and ultimately achieve individual financial well-being*". As a broader concept that also highlights action and behaviour of the individual, the United Kingdom, Canada and the United States have adopted the term "financial capability"[2] which comprehend three areas: (1) knowledge and understanding, (2) skills, and (3) confidence and attitudes (Kempson, Collard and Moore (2005)). Actually, both concepts – financial literacy and financial capability – cover decision-making, practical skills and behaviour as well as knowledge and understanding (O'Connell (2007)).

In addition to theoretical concepts some research focus on operational definitions as they convert conceptual definitions into measurable criteria. Across studies, both performance tests (knowledge-based) and self-reported methods (perceived knowledge) have been employed to measure financial literacy (Huston, 2010). Without being exhaustive the following references provide examples of how financial literacy has been measured.

Hilgert, Hogarth and Beverly (2003) measured financial knowledge using a quiz containing 28 questions, covering budget management, credit, savings, investment, mortgages and a broad category of other financial topics[3]. The authors also assess

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[1] "*Financial education is the process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being*".

[2] Financial capability is also mentioned by Johnson and Sherraden (2007) as a broader concept that also considers the relevance of outside institutions and regulations. Financial capability calls for individuals to develop financial knowledge and skills but also to gain access to financial instruments and institutions.

[3] Financial knowledge score is calculated as a percentage of correct answers. Overall, households correctly answered two-thirds (67%) of the questions.

individuals' financial behaviour using 18 financial-management questions. Moore (2003) adopted a similar approach using 12 financial questions[4]. Performing a factor analysis van Rooij, Lusardi and Alessie (2007) construct a basic financial literacy index (using 5 questions) and an advanced financial literacy index (using 11 questions)[5]. In a different approach, Abreu and Mendes (2010) consider three distinct aspects of financial literacy: specific financial knowledge about the financial market, educational level (used as a proxy for their ability to use gathered information) and the sources of background information commonly used. Financial literacy has also been widely measured using the three simple questions on compounding of interest rates, inflation and risk diversification originally designed by Lusardi and Mitchell (2006)[6] for the U.S. Health and Retirement Study. These questions have been used as a benchmark allowing for comparison across studies[7].

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[4] Financial knowledge score is calculated as the sum of the number of questions answered correctly. The financial score ranges from zero to 12, with a mean score for all respondents of 8.04, corresponding to 67% of respondents giving correct answers.

[5] The mean of correct answers is 3.94 for basic financial literacy and 5.93 for advance literacy. Details available in Appendix A of the paper van Rooij, Lusardi and Alessie (2007).

[6] The questions are: 1) Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than $102, exactly $102, less than $102? 2) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account? 3) Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund.

[7] These questions have been added to the US National Longitudinal Survey of Youth, the 2005 Dutch Household Survey, the 2006 Italian Survey of Household Income and Wealth, the 2008 World Bank Russia Financial Literacy and Financial Education Survey, the 2009 German SAVE, the 2009 New Zealand Financial Knowledge Survey, a survey of pension funds in Mexico and a survey of entrepreneurs in Sri Lanka (Lusardi and Mitchell (2009)). Additionally, Lusardi and Mitchell (2011) report on financial literacy patterns in other seven countries which, like the United States, have added the three financial literacy questions to national surveys, concluding for a widespread financial illiteracy among countries.

It is worth noting that a handful of countries have so far collected data on financial literacy. The United Kingdom (FSA (2006)) was among the first to design a financial capability survey, in 2005, and similar initiatives have been undertaken in the United States (FINRA (2009)), New Zealand (ANZ-Retirement Commission (2009)), Australia (ANZ (2011)), Ireland (Keeney and O'Donnell (2009)), Canada (McKay (2011)), the Netherlands (van Rooij et al. (2009)) and Portugal (Banco de Portugal (2011)). Despite the rich set of information therein the different content and methodologies discourage international comparison which could provide a useful insight on the best practices. The lack of international comparison prompted the OECD and its International Network for Financial Education (INFE) to develop and implement a financial literacy questionnaire (Atkinson and Messy (2011), (2012)) which has been used in 14 countries[8]. Within this pilot study financial literacy is measured considering its three components: knowledge; behaviour and attitudes. Financial knowledge is tested using eight questions related with simple and compound interest, risk and return and inflation[9]. Financial behaviour is evaluated using several questions related with money management, saving, planning, choosing products and borrowing[10]. Financial attitude is assessed using questions

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[8] Of these, Armenia, Czech Republic, Estonia, Germany, Hungary, Ireland, Malaysia, Norway, Peru, Poland, South Africa and the UK originally agreed to pilot the survey in late 2010. Albania and the British Virgin Islands used the questionnaire in 2011, following the agreed methodology.

[9] Based on those questions a financial knowledge score is computed by adding up the number of correct answers and range between zero and eight. The average financial knowledge score range from 4.6 in South Africa and 6.1 in Hungary.

[10] For each question (or the combination of two questions) a value of 1 is given to answers that indicate a positive behaviour and zero in all other cases. The financial behaviour score is the simple sum of points and range between zero and nine. The average score range from 4.5 (Estonia and Albania) and 6.1 (Germany, Malaysia and British Virgin Islands).

focusing on attitudes towards money and planning for the future[11]. In order to assess overall levels of financial literacy the authors propose a financial literacy score that correspond to the sum of the scores for knowledge, behaviour and attitudes[12].

In all different approaches there is a tendency to measure financial literacy through objective tests of financial concepts rather than by asking respondents to provide a self-assessment of their understanding of financial issues. In fact, when using both methods to assess financial literacy results show a discrepancy between what individuals believe they know and what they actually know, with the self-assessment often higher than the actual understanding (OECD (2005), Lusardi and Mitchell (2009)). The measured used in this study (detailed in chapter 4.1) also follows this approach as the questions used to construct the financial literacy index are aimed at evaluating objective knowledge.

2.2   Over-indebtedness: concept and causes

Contrary to conventional wisdom, consumer indebtedness is not, by itself, a bad thing since it allows people to pay for current expenses using future income. Indeed, the standard theoretical framework used to model consumption, saving and indebtedness decisions[13] posits that consumers borrow against future earnings during their early working life when income is low and save during their most productive working years to provide for the decline in income after retirement. This theoretical framework is based on

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[11] The financial attitude score is computed by adding up the responses (in a qualitative scale from 1 to five) and then dividing by three. The average combined score range from 3.7 (Albania and Peru) to 2.3 (Armenia).

[12] The average financial literacy score range from 12.4 (Armenia, South Africa and Poland) to 15.1 (Malaysia, Hungary, Germany and British Virgin Islands) and has a mean value of 13.7.

[13] Life-Cycle theory developed by Modigliani and Brumberg (1954) and the Permanent Income Hypothesis by Friedman (1957).

a set of assumptions about the behaviour of the representative consumer and the institutional setting, such as the consumer being a rational and forward looking, and unrestricted access to credit.

However, substantial evidence suggests that households are not always fully rational when making financial decisions (Campbell (2006)) and that individuals suffer "exponential growth bias" (Stango and Zinman (2009)), that is the tendency to underestimate an interest rate given other loan terms and to underestimate a future value given other investment terms. Moreover, even in relatively simple formulations of the model, the consumer must be very knowledgeable to predict future labour earnings, pensions, social security, interest rates, inflation rates, mortality, and health shocks (Lusardi and Mitchell (2009)). Thus, individuals may make financial decisions that are not welfare maximizing, in particular related to debt, putting themselves at risk of experiencing financial difficulties.

In fact, the growing levels of household's debt across OECD countries have become increasingly worrisome. For the United Kingdom and the United States, data shows an increase in household debt (as a percentage of disposable income) until 2007, when the subprime crisis erupted in the United States (Figure 1). In particular, the mortgage debt (as a percentage of total household liabilities) increased in a faster pace than total liabilities (Table 1). These levels of indebtedness impose strains on household finances. Indeed, data from the Eurobarometer survey (conducted in December 2011)[14] revealed that 18 per cent of the households reported they had run out of money to pay for essential goods and services at some stage during the last 12 months, and a similar proportion

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[14] Flash Eurobarometer 338 - http://ec.europa.eu/public_opinion/flash/fl_338_en.pdf

(21%) expressed difficulties in keeping up with household bills and credit commitments. In the United States, in the 2009 Panel Survey of Consumer Finances[15], 6 per cent of the households reported having been sixty or more days late on a required debt payment over the previous year.

Despite the concern with the excess levels of indebtedness there is no agreed definition of 'over-indebtedness', on how to measure it or on where to draw the line between normal and over-indebtedness (European Commission (2008) and Disney et al. (2008)). Many different data and indicators have been used by researchers to quantify or identify over-indebtedness situations. Those can be classified in two groups: aggregate measures to quantify the size of the phenomenon (e.g. debt-to-disposable income; debt servicing-to-disposable income, etc.) and individual measures to identify the socioeconomic profile of individuals in debt (individual's ability to make ends meet; payment arrears, etc.) (Vandone (2009)).

Considering a structural and life-cycle-based approach the German Federal Ministry, cited by Haas (2006), defines over-indebtedness as follows: "*A household is regarded to be over-indebted when its income, in spite of a reduction of the living standard, is insufficient to discharge all payment obligations over a longer period of time*" (ibid. page 4). In addition, Anderloni and Vandone (2010) affirm that "*over-indebtedness is a phenomenon that occurs when an individual's level of debt cannot be sustained in relation to current earnings and any additional resources raised from the sale – at fair conditions - of real or financial assets*" (ibid. page 113).

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[15] http://www.federalreserve.gov/econresdata/scf/scf_2009psurvey.htm

In a cross-country study provided by Betti et al. (2007) a subjective approach has been adopted. Over-indebted households are identified as those that expressed difficulty or serious difficulty in making debt payments as recorded in household surveys. Conversely, Disney et al. (2008) consider that a criterion of 'over-indebtedness' based on current or prospective arrears is the most appropriate. Hence, an individual who has failed to meet a required payment on an outstanding credit commitment is deemed to be 'over-indebted'. They further explain that self-reported problems are not always associated with specific adverse financial circumstances or evidence of arrears, but partly linked to perceptions and expectations of individuals.

Concerning the causes of over-indebtedness, literature (Banque de France (1996) and Vandone (2009)) typically identifies two types of over-indebtedness: "passive" and "active". The first is due to the existence of exogenous factors such as job loss, divorce or separation, illness or macroeconomic shocks variables. These factors can eliminate or reduce an income source and thus impact repayment capacity. The second is caused by over-borrowing, following decisions of an individual to borrow up to a level that is unsustainable, in the belief of improved future economic and financial conditions. The distinction between active and passive over-indebtedness is not clear-cut as poor financial management skills and lack of basic financial knowledge lead individuals to under-estimate the probability of experiencing adverse shocks that strongly impact household income (Frade, Lopes, Jesus and Ferreira (2008)).

Disney et al. (2008) grouped the drivers of over-indebtedness into three categories: financial imprudence, household income shocks and macroeconomics shocks. Within the first group the lack of financial literacy is pointed as a major cause of over-indebtedness

due to (i) over-borrowing – individuals do not understand the true cost of credit; (ii) under-insurance – individuals fails to adequately insure themselves against adverse events (e.g. unemployment, illness, etc.) and (iii) relative price shocks – individuals fail to adjust their consumption patterns following a reduction in real income. Income shocks are typically unforeseen and difficult to anticipate and might move individuals from a stable financial situation in which they are able to pay bills and meet credit commitments to one in which they fall in arrears. For the second group three principal sources of income shocks are identified: unemployment, divorce and illness. The final set accounts for macroeconomic shocks which includes interest rates changes (in particular, reflecting individual-specific changes in circumstances or repayment behaviour) and restrictions on credit, leading to tied refinance conditions.

Other studies relate over-indebtedness to specific socioeconomic characteristics, concluding that having children, being a single parent, being separated or divorced, having low income, being unemployed, living in rented accommodation and having a mortgage, increase the likelihood of over-indebtedness. Over-indebtedness has also been linked to gender, with men being less likely to experience arrears, and to age, with younger people being more at risk because they are less reluctant to use credit to finance their expenditure. Yet, empirical studies indicate that the increased probability of being over-indebted among young people is relatively small. Other factors like ill-health, ethnicity and personality traits also influence the probability of experiencing financial difficulties (European Commission (2008); Disney et al. (2008), Fondeville et al. (2010)).

Given the lack of a single definition of over-indebtedness I use three different measures, detailed in chapter 4.3, in order to encompass most of the interpretations discussed above.

2.3 Financial literacy and individual financial decisions

Even though the relation between financial literacy and financial behaviour deserves further investigation there are some evidences of correlation and causality between knowledge and behaviour in personal finance. Hilgert, Hogarth, and Beverly (2003) look at this connection for four financial areas – budget management, credit, savings, and investment – and find strong links between financial knowledge and financial practices. Atkinson and Messy (2012) also find a positive relationship between knowledge and behaviour – higher knowledge scores are associated with higher behaviour scores. Even though, no conclusive evidence is provided that financial literacy leads to sound individual financial decisions. Notwithstanding, Courchane and Zorn (2005) develop a three-step recursive model regression analysis linking financial knowledge to financial behaviour, and then linking financial behaviour to credit outcomes. The authors find that knowledge is a key explanatory variable for behaviour, while behaviour, in turn, is a significant determinant of credit outcomes, providing strong evidence that the causal connection runs from knowledge to behaviour.

The literature shows that basic knowledge is tied to more efficient financial behaviour such as planning and saving for retirement (Lusardi and Mitchell (2006), van Rooij et al. (2011)), accumulating wealth (Stango and Zinman (2009)), investing in the stock market (Christelis, Jappelli and Padula (2010), van Rooij et al. (2007)) and diversifying portfolio (Abreu and Mendes, (2010)).

There is also some indication by recent research that financial illiteracy affects borrowing behaviour leading to higher debt levels at higher cost. The work conducted by Moore (2003) concludes that respondents with lower levels of financial literacy are more likely

to have costly mortgages since they don't understand interest rates, loans or how loan works. Moreover, lower financial literacy explains the difference in mortgage experiences with lenders and the occurrence of engaging in loans with less beneficial or more financially harmful terms. Consistent with those findings the 'Miles Review' (Miles (2004)) revealed that borrowers have a poor understanding of mortgages and interest rates since many do not pay much attention to the likely level of future interest rates in choosing between variable and fixed rates and many pay overwhelming attention to the current variable interest rate.

Considering mortgage decisions, Campbell (2006) concludes that households choose between fixed rate mortgages (FRM) and adjustable rate mortgages (ARM)[16] irrationally and that many households do not take advantage of beneficial mortgage refinance opportunities (e.g. in generally declining interest rates environment). Bucks and Pence (2008) find that borrowers with ARM are not aware of various aspects of their contract terms and tend to underestimate how much their interest rate can increase in one shot and over a lifetime. This lack is explained by difficulties in gathering and processing the information – either because these borrowers have lower cognitive abilities or lower levels of financial literacy. Additionally, Fornero, Monticone and Trucchi (2011) find that individuals with higher financial literacy are more likely to choose an FRM, which is interpreted as the effect of the greater awareness of more financially knowledgeable households of the income risk embedded in ARM.

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[16] With an ARM borrowers may benefit from a lower initial payment but are exposed to more risk because the mortgage repayments can go up as interest rates in the overall economy fluctuate.

Despite the link between financial literacy and borrowing decisions much less research has been done on financial literacy and over-indebtedness. The paper of Lusardi and Tufano (2009) finds a significant association between debt literacy[17] and self-assessed over-indebtedness: those with lower levels of debt literacy tend to judge their debt as excessive or report that they are unsure about the appropriateness of their debt position. Gathergood and Disney (2011) present new evidence for the United Kingdom on Lusardi and Tufano (2009) work and find that less financially literate households are more likely to report credit arrears or difficulty in paying their debts. Recent research also suggests that financial literacy reduces the probability of delays in mortgage payments (Fornero, Monticone and Trucchi (2011)) and leads to lower delinquency rates (Agarwal et al. (2010)). As well, using a sample of subprime borrowers, Gerardi et al. (2010) find a significant and quantitatively large association between numerical ability – one aspect of financial literacy – and mortgage delinquency. Moreover, using the data from the UK Financial Capability Survey, McCarthy (2011) examine the relationship between over-indebtedness and financial literacy, alongside with personal traits of individuals, and find that individuals with higher levels of financial literacy are less likely to experiences financial distress, either in less or more extreme forms such as running out of money and going into arrears. In the same way, Gathergood (2011) empirically examines how financial literacy relates to over-indebtedness using the data from UK DebtTrack survey[18]. The author considers three measures of over-indebtedness: i) one month

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[17] Debt literacy refers to the ability to make simple decisions regarding debt contracts and applying basic knowledge about interest compounding to everyday financial choices.

[18] The DebtTrack survey is a quarterly repeated cross-section survey of a representative sample of UK households covering approximately 3,000 households which is conducted via the internet. In order to measure financial literacy and other behavioural traits the authors incorporated their questions into the September 2010 wave.

delinquency on at least one credit item; ii) three months delinquency on at least one credit item and iii) a self-reported measure of over-indebtedness; and concludes that individuals with higher financial literacy levels are less likely to experience over-indebtedness. However, the results suggest that financial literacy is not associated with more severe levels of debts and that self-reported measures may be a less reliable indicator of debt.

Financial literacy has also been referred as an important preventive measure that seeks to achieve more responsible borrowing[19] by individuals and to prevent the causes of over-indebtedness (Vandone (2009) and European Commission (2008)). This is also the view of the OECD (2009) which considers that higher levels of financial literacy of individuals should contribute to prevent over-indebtedness bearing in mind that the promotion of financial literacy seeks to improve individuals' knowledge, understanding, skills and confidence needed to adequately appraise credit options; to improve their capacity to take informed decisions and to look for financial advice if needed; and to develop money management and financial planning abilities, taking into account their possible future income and life cycle.

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[19] In accordance with the European Commission (2009) "Responsible lending means that credit products are appropriate for consumers' needs and are tailored to their ability to repay." (page 3). "Responsible borrowing means that individuals, when seeking to buy a credit product, will make efforts to inform themselves of the products on offer, be honest when providing information on their financial situation to the lender or credit intermediary, and take their personal and financial circumstances into account when making their decision. As a consequence, this prudence should help the borrower to select the credit product that is most appropriate for their needs, potentially leading to lower default and foreclosure rates." (page 10)

3   Data

3.1   State-by-state survey in the United States

The dataset consist of the National Financial Capability Study (FINRA, 2009) commissioned by the Financial Industry Regulatory Authority - Investor Education Foundation and conducted in consultation with the U.S. Treasury Department and the PACFL[20]. I use the state-by-state online survey which was fielded between June-October, 2009[21]. The data was collected through an online survey of 28,146 respondents, aged 18 years or older, with approximately 500 interviewed in each of the 50 states plus the District of Columbia[22].

The survey was design to shed light on the causes of the financial crisis looking at the financial capability of individuals measured in terms of how well people make ends meet, plan ahead, choose and manage financial products, and possess the skills and knowledge to make financial decisions.

The bulk of the survey questions are focused on eight financial topics. The first section covers habits and attitudes in managing household budget such as willingness to take risks, household spending relative to income, availability of a "rainy day" fund, saving for retirement or college education and whether a large drop in income was experienced in the past year. The second section addresses the use of financial counselling related to debt, savings and investment, insurance and tax planning. The third section is devoted

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[20] The study consists of three inter-linked surveys: (1) a national sample of 1,500 U.S. respondents; (2) a state-by-state analysis of more than 28,000 respondents; and, (3) a survey of 800 military personnel and spouses.

[21] Data retrieved from http://www.finrafoundation.org/programs/capability/index.htm in January, 2012.

[22] The variables are weighted to match the Census distributions on certain demographic variables within each state.

primarily to banking and financial matters. The fourth section focuses on retirement accounts and pensions. The fifth section primarily asks questions about homeownership, mortgage, monthly mortgage payments, and any experiences with arrears or foreclosure. The sixth section focuses on credit cards and the seventh section addresses consumer loans. The eighth section covers insurance topics. The survey also comprises a final group of questions that were designed to probe the financial knowledge of the respondents.

The survey also includes a set of socioeconomic questions about gender, age, race, education, marital status, living arrangements, income, employment status, number of children, who in the household is most knowledgeable about savings, investing, and debt, and who in the household usually pays the bills.

3.2 Characteristics of the sample

Summary statistics of the sample are provided in Table 2. The whole sample is comprised of 28,246 respondents. Most respondents are women (53%), with 45-54 years old (21%), white race (excluding Hispanic) (76%) living in the South region of the US (34%), married (56%) and without dependent children (60%). Almost half of respondents (48%) work for an employer and 19 per cent have an annual income that range between 50,000$ and 75,000$. As for education, most respondents attended some college (35%), 24 per cent are college graduate and only 3 per cent did not complete high school. Most respondents are married (56%) and have no dependent children (60%).

Most homeowners have a mortgage (69%) where the most common type is a fixed-rate mortgage (90%). Considering the occurrence of adverse shocks, a sizeable proportion of respondents (40%) has experienced a large drop in income in the past 12 months.

4 Model and methodology

The goal of my work is to identify the main factors that might drive individuals into over-indebtedness. I consider three measures of over-indebtedness: experiencing financial distress, being in arrears and being involved in a foreclosure procedure. A key area is whether the financial literacy level of individuals affects their ability to manage their finances with success and avoid financial difficulties. I understand financial literacy as financial knowledge which is consistent with the definition of financial literacy suggested by Hung et al (2009). Yet, according to most definitions, financial literacy goes beyond financial knowledge. Thus, I also analyse the impact of financial behaviour on the likelihood of becoming over-indebted. The methodology to quantify financial literacy, financial behaviour and over-indebtedness is described in the following sections.

4.1 Financial literacy measure

I use the set of five financial literacy questions comprised in the survey to evaluate the financial knowledge of individuals and to construct a measure of financial literacy. This approach is quiet common to the one adopted by Atkinson and Messy (2011). The wording of the question and answer options used in the survey is the following[23]:

(1) *Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years how much do you think you would have in the account if you left the money to grow: (a) more than $102*; (b) Exactly $102; (c) less than $102; (d) don't know; (e) prefer not to say.*

(2) *Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with*

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[23] Correct answers noted by an asterisk.

the money in the account? (a) more than today; (b) exactly the same; (c) less than today*; (d) don't know; (e) prefer not to say.

(3) If interest rates rise, what will typically happen to bond prices? (a) they will rise; (b) they will fall*; (c) they will remain the same; (d) there is no relationship between bond prices and the interest rate; (e) don't know; (f) prefer not to say.

(4) A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. (a) true*; (b) false; (c) don't know; (d) prefer not to say.

(5) Buying a single company's stock usually provides a safer return than a stock mutual fund. (a) true; (b) false*; (c) don't know; (d) prefer not to say.

The first question measures numeracy, or the capacity to do a simple calculation of compounding interest rates. The second question assesses the understanding of inflation, in the context of a simple financial decision. The third question concerns the relationship between the price and yield of a fixed income asset; as it may be the most complex question of the set, it was designed to differentiate among levels of financial knowledge. The fourth question measures the understanding of mortgages and mortgage payments, an important question given the experience on subprime mortgages and the financial crisis. Finally, the fifth question gauges knowledge of risk diversification; it is intended to jointly test knowledge about "stocks" and "stock mutual funds," and that of risk diversification.

Responses to these financial literacy questions are presented in Table 3. The vast majority of respondents answered the 'interest rate question' (80%), 'inflation question' (68%) and 'mortgage question' (79%) correctly. However, the proportion of correct answers decreases when considering the question on the impact of inflation on money value. The

worst performance is on the 'bond price question' where 32 per cent of respondents failed and 37 per cent admitted not knowing the answer, followed by the 'risk question', where 37 per cent of respondents also admit not knowing the answer (Figure 2). When considering all the questions (Table 4) only 17 per cent of respondents were able to answer all the questions correctly. On average respondents correctly answered 3 questions.

Based on this financial literacy quiz I construct a financial literacy index – "**FL INDEX"** – which is defined as the percentage of questions correctly answered. The "don't know" and "prefer not to say" were categorized as wrong answers. The FL INDEX can take distinct values of 0, 0.2, 0.4, 0.6, 0.8 and 1 (Table 5). Consistent with the results above, the mean value of the FL INDEX across all respondents in the study is 0.625 which correspond to slightly more than 3 questions correctly answered on average. The median value is 0.6 and standard deviation is 0.283. As depicted in Figure 3, 29 per cent of respondents show a FL INDEX of 0.8 which corresponds to 4 correct answers.

The FL INDEX varies quiet substantially across socioeconomic characteristics of respondents (Table 6). Financial literacy is lower among women, non-white and younger people (Figure 7). There is evidence of a positive relationship between income and education and financial literacy where higher income and education levels are associated with a higher FL INDEX (Figure 8). Unemployed and inactive[24] respondents show lower levels of financial literacy than employed or retired respondents. Within the working class category, the self-employed show higher financial literacy levels. The respondents with a home mortgage have a higher FL INDEX than those without mortgage. There is however

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[24] Full-time student, homemaker, permanently sick, disabled or unable to work.

no difference according to the type of mortgage (fixed-rate or adjustable-rate mortgage). As for the event of an unexpected financial shock, respondents that had a large drop in income in past 12 months have a lower level of financial literacy. This evidence is somewhat worrisome since financial skills are required for adequately deal with an unexpected reduction in income.

4.2 Financial behaviour measure

In order to measure financial behaviour I have selected eight questions from the survey that concern individuals' financial choices in different contexts, namely related with budget management, savings, credit, insurance and financial advice. This approach has been recently used by Atkinson and Messy (2012). The wording of the question and answer choices is the following[25]:

(1) *Over the past year, would you say your household's spending was less than, more than, or about equal to your household's income? (…) (a) spending less than income*; (b) spending more than income; (c) spending about equal to income*; (d) don't know; (e) prefer not to say.*

(2) *Do you or your spouse/partner overdraw your checking account occasionally? (a) yes; (b) No*; (d) don't know; (e) prefer not to say.*

(3) *Have you ever tried to figure out how much you need to save for retirement? (non-retired respondent) or before you retired, did you try to figure out how much you needed to save for retirement? (retired respondent). (a) yes*; (b) no; (d) don't know; (e) prefer not to say.*

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[25] Answers that indicate a "positive financial behaviour" are noted by an asterisk. Respondents could indicate they did not know the answer or could choose to refuse to answer.

(4) Have you set aside emergency or rainy day funds that would cover your expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies: (a) yes*; b) no; (d) don't know; (e) prefer not to say.

(5) In the past 12 months, which of the following describes your experience with credit cards? I always paid my credit cards in full: (a) yes*; (b) no; (d) don't know; (e) prefer not to say.

(6) Please indicate if (…) in the past 5 years (…) you have taken out a short term "payday" loan[26]? (a) Yes; (b) No*; (d) don't know; (e) prefer not to say.

(7) Are you covered by health insurance? (a) yes*; (b) no; (d) don't know; (e) prefer not to say.

(8) In the last 5 years, have you asked for any advice from a financial professional about i) savings or investments; ii) taking out a mortgage or a loan? (a) yes*; (b) no; (d) don't know; (e) prefer not to say.

The responses to these questions are presented in Table 7. The first two questions analyse how individuals balance monthly income and expenses. One fifth of the respondents reported that their spending, in the past year, exceeded income (question 1) and nearly one-quarter (24%) reported overdrawing their checking account occasionally (question 2). Planning ahead is important for retirement preparedness or to make provisions to buffer against adverse shocks. Answers to the third questions show that more than half of the respondents (53%) had not tried to calculate how much they need to save for retirement. Additionally, 60 per cent of respondents have not set aside an emergency or 'rainy day fund' (question (4)). Concerning credit behaviour, 43 per cent of the respondents do not pay their credit card balance in full, which implies interest payment (question 5). As for the use of alternative forms of borrowing, such as taking a "payday loan", 9 per cent of

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[26] "Payday" loans are small-dollar, short-term, unsecured loans that borrowers promise to repay out of their next paycheck or regular income payment.

respondents have used this kind of high-cost borrowing method (question (6)). In relation to insurance coverage, 18 per cent of respondents reported not being covered by a health insurance (question 7). Finally, question 8 refers to financial counselling where most people assume not having asked for a professional advice neither on savings and investments (66%) or loan and mortgages (71%). As showed in Figure 6 respondents tend to behave worse concerning savings (for retirement and for an emergency fund) and the payment of credit cards balances. There is also a disregard in relation to financial advice.

Based on the questions above I construct a financial behaviour index – **"FB INDEX"** – by scoring the respondents answers. In the first question the answer "spending less than income" takes a value of 2, the answer "spending about equal to income " takes a value of 1 and the answer "spending more than income " is scored with zero. For questions (3), (4), (5), (7) e (8) a "yes" takes a value of 1 and a "no" is scored with zero. For questions (2) and (6) a "no" takes a value of 1 and a "yes" is scored with zero. For all questions the answers "don't' know" and "prefer not to say" were dropped and for question (2) and (5) the NA cases were also excluded. Only the respondents that answered all questions were considered, so overall 9,713 individuals were excluded from the total sample of 28,246 respondents.

The FB INDEX corresponds to the sum of points obtained in each question divided by ten and can take distinct values of 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1. The FB INDEX has a mean of 0.611 and standard deviation of 0.172. Both median and mode take a value of 0.6 (Table 8 and Figure 5).

Table 6 shows the FB INDEX across socioeconomic characteristics of respondents. Women, non-white and younger people show a poorer financial behaviour (Figure 9).

There is also evidence of a positive relationship between financial behaviour and income and education where higher income and education levels are associated with a higher FB INDEX (Figure 10). The retired respondents show a higher FB INDEX, followed by those who are employed. There is no substantial difference on the FB INDEX between the respondents with and without a home mortgage. Still, those with a fixed-rate show a higher FB INDEX compare to those with an adjustable-rate mortgage. Lastly, those who experienced an unexpected drop in income exhibit a poorer financial behaviour.

4.3   Over-indebtedness measure

The survey includes questions designed to assess if an individual has experienced financial distress or more severe financial difficulties. Consistent with the over-indebtedness definitions reviewed in chapter 2, I have used different questions to outline three measures of over-indebtedness. Considering that an individual might be regarded as over-indebted when his income is insufficient to discharge all payment obligations (Haas (2006)) the first measure refers to the experience of financial distress and it is based on the responses to the following question:

(1) In a typical month, how difficult is it for you to cover your expenses and pay all your bills? (a) very difficult*; (b) somewhat difficult*; (c) not at all difficult; (d) don't know; (e) prefer not to say.

The inability to regularly meet mortgage obligations is a key indicator of over-indebtedness (Disney et al. (2008)). Accordingly, the next two measures of over-indebtedness are connected with mortgage delinquency and are based on the responses to the following questions:

(2) How many times have you been late with your mortgage payments in the last 2 years? (a) never; (b) once*; (c) more than once*; (d) don't know; (e) prefer not to say.

(3) Have you been involved in a foreclosure process on your home in the last 2 years? (a) yes*; (b) no; (c) don't know; (d) prefer not to say.

The responses to the above three questions are reported in Table 9. Most individuals (60%) expressed difficulty in covering monthly expenses and making debt payments and 17 per cent reported that it was very difficult to do so. In relation to mortgage payment, 19 per cent of borrowers reported having been late with their mortgage payments at least once in the last two years, and 12 per cent of respondents missed payments more than once. Overall, 3 per cent of respondents reported having been involved in a foreclosure process in the last two years[27]. As showed in Figure 6, financial distress is the most common situation across respondents, followed by the event of arrears (noting that only respondents with mortgage are considered) and the involvement in a foreclosure process.

Using the responses to question (1), I create a variable called "**FINSTRESS"** which is equal to one for respondents reporting difficulties in covering expenses and paying bills (very or somewhat difficult) and equal to zero for those who report no difficulties. The respondents that answered "don't know" and "prefer not to say" were excluded. Next, I use the responses to question (2) and create a variable named "**ARREARS**" which is equal to one for respondents answering "once" or "more than once" and equal to zero for those who have never been late. The respondents with no mortgage and the "don't know" and "prefer not to say" cases were excluded. Lastly, I use the responses to question (3) and create a variable called "**FORECLOSURE**" which is equal to one for all respondents

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[27] Normally, foreclosure proceedings are initiated when a borrower is 120 days delinquent on his mortgage.

answering "yes" and equal to zero for those who said "no". The "don't know" and "prefer not to say" cases were excluded. A summary of statistics of the three over-indebtedness measures is presented in Table 10.

The over-indebted respondents have a similar socioeconomic profile (Table 2): white female from the South, married, who attended some college, employed (working for an employer in full-time or part-time) and with a fixed-rate mortgage. The respondents that have been involved in foreclosure procedure are on average younger than those who have experienced financial distress or those who have been in arrears. Most over-indebted respondents are middle-class (annual income between $35,000 and $75,000). Having children is also a differentiating factor where most respondents in financial distress do not have financially dependent children contrary to those in arrears or involved in a foreclosure process. Moreover, the typical over-indebted respondent has experienced a large drop in income.

Overall, over-indebted respondents have lower levels of financial literacy and poorer levels of financial behaviour (Table 11). The mean value of FL INDEX and FB INDEX for over-indebted respondents is below the mean value of the total sample (except for "arrears" where there is no significant difference for the FL INDEX). The FL INDEX distribution for "foreclosure" is more symmetric and the FL INDEX distribution for "arrears" is more peaked (Figure 11). As for financial behaviour, the FB INDEX distribution for "foreclosure" is the closest to the normal distribution and the FB INDEX distribution for "arrears" is more peaked (Figure 12).

4.4 Econometric model

Next I seek to model the relationship between financial literacy and financial behaviour and over-indebtedness controlling for socioeconomic characteristics of respondents, the type of mortgage and the event of a negative income shock. The variables considered (described in Table 12) are: gender; age（18-34, 35-54 and 55 years old or more); race (white or non-white), region (Midwest, Northeast, South and West); having children; marital status (divorce, separated, windowed or widower, married and single); education (college or no-college); income level（below \$25,000, between \$25,000 and \$50,000, between \$50,000 and \$100,000; and more than \$100,000); employment status (working for an employer in full-time or part-time; self-employed; unemployed; inactive – full-time student, homemaker, permanently sick, disabled, or unable to work – and retired). I also include the type of mortgage (adjustable rate or fixed rate mortgage) and the experience of a large drop in income.

Hence, I specify the following probit model[28] for each over-indebtedness measure:

$$P(Y_i = 1 | X_i, DI_i, FL_i, FB_i) = F\ (X_i{}'\beta + \rho DI_i + \gamma FL_i + \delta FB_i) \qquad \text{(Equation 1)}$$

The dependent variable Y_i is the probability of a respondent being over-indebted taking a value of one (Y_i=1) if the respondent i) is on financial distress; ii) has been in arrears and iii) has been involved in a foreclosure process; and zero otherwise. The endogenous

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[28]Specifying a Linear Probability Model, estimated by OLS, would produce predicted probabilities that are less than zero or greater than one. The common solution is to specify a logit or probit model, which constrains the estimated probabilities to be between zero and one. These models assume that there is a latent, unobserved variable y* determined by y*= β_0+X'β+ϵ , and assumes that y is one if y*> 0, and y is zero if ≤0. The error term ϵ are assumed to be independent of vector X and either has the standard logistic distribution or the standard normal distribution. Given the normality assumption for ε the probit model is more popular than logit in econometrics (Wooldridge, 1999).

variable *DI* is a 1/0 dummy indicator variable for the event of drop in income, *FL* is the financial literacy index, *FB* is the financial behaviour index, *X* is a vector of control variables including socioeconomic variables and type of mortgage and *F* () is the cumulative distribution function of the standard normal distribution.

Consistent with the literature review above, I expect that being female and younger, having children; being divorced or separated; having low income, being unemployed and having a mortgage increases the probability of over-indebtedness. In particular, I presume that having an adjustable-rate mortgage (ARM) contributes positively to the likelihood of over-indebtedness because individuals with ARM are more exposed to interest rate fluctuations. Since negative income shocks are pointed as a major cause of over-indebtedness the event of a large drop in income within the past 12 months is included in the model. As for financial literacy and financial behaviour I expect both to decrease the probability of over-indebtedness.

5   Results

The results of the probit estimation for each of the over-indebtedness measures are presented in Table 13, where the marginal effects for the probit regressions are reported[29]. The Wald chi2 test results and the Pseudo R^2 are also shown. The probit regressions were re-estimated with robust standard errors given that the likelihood-ratio tests of *heteroskedasticity* (LR test in Table 13) suggest the existence of *heteroskedasticity*.

5.1   Socioeconomic characteristics and type of mortgage

I begin by examining the role of socioeconomic characteristics and type of mortgage in the probability of over-indebtedness distinguishing between the experience of financial distress, being in arrears and getting involved in a foreclosure procedure. The results presented in columns (1) of Table 13 show, as expected, that men are less likely than women to become over-indebted although the results are not statistically significant for foreclosure. Surprisingly, respondents with 35-54 years old and 55 years old or more are 6 per cent more likely than the youngest to experience financial distress.

Respondents with 35-54 years old are also 2 per cent more likely of falling in arrears while results are not significant for respondents with 55 or more years old. The opposite happens with foreclosure where older respondents are 1 per cent less likely than the younger to experience a foreclosure process – it seems that the older people try harder to preserve their home. White race respondents are less likely than non-white (including

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[29] Probit estimations were computed in STATA. Marginal effects are reported instead of coefficients since those have not a straightforward interpretation as they give the impact of the independent variable on the latent variable y*, not y itself. For dummy explanatory variables STATA computes the effect on the predicted probability of switching the dummy from zero to one, holding other x variables at their means instead of taking a derivative.

Hispanic) of experiencing financial troubles and the results are statistically significant for all over-indebtedness measures. The results for the living region are not conclusive: people from the South of the US are less likely to experience financial distress but are more likely to fall behind mortgage payments (results are not significant for foreclosure). I find it that having children definitely increases the probability of over-indebtedness: respondents with financially dependent children are 14 per cent more likely to experiencing financial distress, 9 per cent more likely to fall in arrears and 2 per cent more likely to get involved in a foreclosure procedure. Surprisingly, results are not significant in what concerns marital status, although married respondents are less likely than singles to get involved in a foreclosure process – married couples seem to try harder to keep their home. As expected, higher levels of education and income reduce the probability of over-indebtedness and the results are statistically significant for the three measures. Graduate respondents are 6 per cent less likely to go through financial distress or fall behind mortgage payments and 1 per cent less likely to deal with a foreclosure process. Respondents with higher income are less likely to report that they are in financial distress, in arrears or involved in a foreclosure procedure. Work status also matters for over-indebtedness: unsurprisingly, unemployed and self-employed respondents are more likely than employed respondents to experience financial distress, falling in arrears or dealing with a foreclosure process. For example, being unemployed increases the probability of financial distress by 14 per cent, the probability of arrears by 7 per cent and the probability of foreclosure by 2 per cent. Retired respondents are 10 per cent less likely to experience financial distress or falling in arrears (results are not significant for foreclosure). Finally, I find it that having an adjusted rate mortgage (ARM) increases the probability of over-indebtedness and the results are statistically significant in the three

cases: respondents with an ARM are 10 per cent more likely to experience financial distress, 13 per cent more likely to fall in arrears and 3 per cent more likely to deal with foreclosure than respondents with an FRM. These results are not a surprise since individuals with ARM may have to deal with unexpected increases in mortgage instalments.

5.2 Negative income shock

The effects of a large drop in income in the past 12 months on the likelihood of over-indebtedness are reported in columns (2) of Table 13. As expected, a negative shock in income greatly increases the probability of over-indebtedness: respondents who had a drop in income are 30 per cent more likely to report financial distress, 14 per cent more likely to fall behind mortgage payments and 3 per cent more likely to deal with foreclosure.

The inclusion of the event of a large drop in income does not change the significance of most variables, with the exception of those related with race, region, marital and employment status. For example, being white or living in the South is no longer a determinant of financial distress. Also, married respondents are now 2 per cent less likely to fall in arrears than single respondents. Concerning employment status being self-employed is no longer significant to explain financial distress and being unemployed is no longer significant to explain over-indebtedness in general. This may reflect the fact that the large drop in income reported results from a job loss. Despite the evidence of strong correlation between unemployment and drop in income, causing multicollinearity, the models appear quite robust as most variables are still significant after controlling for a drop in income.

5.3 Financial literacy

Financial literacy also matters for the prevention of over-indebtedness as shown by the results reported in columns (3) of Table 13. Controlling for socioeconomic factors, type of mortgage and the event of a negative income shock already discussed, I find it that the financial knowledge level of individuals, measured by the FL INDEX, substantially reduces the probability of over-indebtedness. The results show that financial literacy decreases the probability of experiencing financial distress by 11 per cent, decreases the probability of falling in arrears by 9 per cent and decreases the probability of getting involved in a foreclosure process by 2 per cent.

The introduction of the FL INDEX does not change the significance of variables[30] and introduces only very minor changes in the parameters values, which is an indicator of the robustness of the model.

5.4 Financial behaviour

Finally, in columns (4) I assess the impact of having a positive financial behaviour on the incidence of over-indebtedness. Controlling for socioeconomic factors, type of mortgage, the event of a negative income shock and financial literacy, I find, as expected, that having a positive financial behaviour highly reduces the probability of over-indebtedness. The results show that a higher FB INDEX decreases the probability of getting involved in a foreclosure process by 4 per cent, decreases the probability of falling in arrears by 39 per cent and decreases the probability of experiencing financial distress by 95 per cent[31].

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[30] Noting that male are now 1 per cent more likely than female to get involved in a foreclosure process.

[31] The FB INDEX includes a question related with the spending behaviour of individuals where those who spend more than their income reveal poorer financial behaviour and will most probably experience financial distress.

The addition of the FB INDEX changes the significance of some variables. It eliminates, for example, the significance of having a college education to explain financial distress and a foreclosure situation and the significance of income on the probability of falling in arrears, although respondents with an annual income above $100.000 (INC4) are still 5 per cent less likely to fall behind mortgage payments. These results point to the existence of a correlation between education or income and financial behaviour where less educated or less wealthy individuals reveal a poorer financial behaviour. In addition, FL INDEX loses its significance in explaining the incidence of financial distress but remains significant for explaining arrears and foreclosure. These results suggest that experiencing financial distress is more about financial behaviour than financial knowledge but for more severe financial difficulties, like falling in arrears or getting involved in a foreclosure procedure, financial literacy plays an important role for the prevention of over-indebtedness.

6   Conclusion

The growing number of over-indebted households has become increasingly worrisome, not only because of the implications for the individuals involved but also because of the impact of this phenomenon on the financial system and on the welfare of society as a whole. My work examines the main factors that drive people into over-indebtedness focusing on financial literacy and financial behaviour of individuals.

Using the data from the National Financial Capability Study carried out in the United States in 2009, I analyse the impact of financial literacy and financial behaviour on the likelihood of over-indebtedness. Based on the survey questions, I have defined three measures of over-indebtedness – financial distress, arrears and foreclosure –, and constructed a financial literacy index and a financial behaviour index. I conclude that experiencing financial distress is the most common situation followed by falling in arrears and the involvement in a foreclosure procedure, and that over-indebted individuals have typically lower financial literacy levels and poorer levels of financial behaviour.

Considering socioeconomic factors, I find it that male and younger people are less likely of experiencing financial distress and that male are less likely of being in arrears although male are more likely of getting involved in a foreclosure process. I show that people with children and lower income are more likely to become over-indebted as are individuals with an adjusted rate mortgage. Those results are robust when controlled for i) a large drop in income; ii) financial literacy and iii) financial behaviour.

I find that experiencing a large drop in income is an important determinant of over-indebtedness. I show that financial literacy contributes to the prevention of over-indebtedness since individuals with higher levels of financial literacy are less likely of

becoming over-indebted. However, financial behaviour emerges as having a greater impact. This is an important result as individuals who engage in positive financial behaviours, such as spending less than income, set a 'rainy day' fund, use credit wisely and look for financial advice, are less likely to experience severe financial difficulties.

These results have important policy implications, namely concerning the design of programs and strategies aimed at promoting financial literacy and at preventing over-indebtedness. In particular, these programs should not only focus on individual's financial knowledge but also on how to use that knowledge to effectively manage financial resources.

7   References

Abreu, M. and Mendes, V. (2010), "Financial literacy and portfolio diversification", *Quantitative Finance*, Volume 10, Issue 5.

Agarwal, S.; Amromin, G.; Ben-David, I.; Souphala, C. and Evanoff, D. (2010), "Learning to Cope: Voluntary Financial Education Programs and the Housing Crisis", *American Economic Review*, American Economic Association, vol. 100(2), pages 495-500, May.

Anderloni, L. and Vandone, D. (2010)," Risk of overindebtedness and behavioural factors" in RISK TOLERANCE IN FINANCIAL DECISION MAKING, C. Lucarelli, G. Brighetti, eds., Palgrave Macmillan.

ANZ-Retirement Commission (2009), "Financial Knowledge Survey". Available at http://www.financialliteracy.org.nz/sites/default/files/webfm/Research/r-fksurvey-2009.pdf

ANZ (2011), "Survey of Adult Financial Literacy in Australia".   Availabe at http://www.anz.com/resources/f/9/f9fc9800493e8ac695c3d7fc8cff90cd/2011-Adult-Financial-Literacy-full.pdf.pdf?CACHEID=f9fc9800493e8ac695c3d7fc8cff90cd

Atkinson, A. and Messy, F-A. (2011), "Assessing Financial Literacy in 12 Countries – An OECD Pilot Exercise" Netspar Discussion Paper 01/2011-014.

Atkinson, A. and Messy, F-A. (2012), "Measuring financial literacy: Results of the OECD/International Network on Financial Education (INFE) Pilot Study", OECD Working Papers on Finance, Insurance and Private Pensions, n.º 15, OECD Publishing.

Banco de Portugal (2011), "Survey on the Financial Literacy of the Portuguese Population (2010) – Final Report".

Banque de France (1996), "Traitement du surrendettement: nouvelles perspectives", bulltin 2 trimestre, Supplement Etudes.

Betti, G., Dourmashkin, N., Rossi, M. C. and Yin, Y. P. (2007), "Consumer in the EU: measurement and characteristics", *Journal of Economic Studies*, 34, 2, 136-156.

Bucks, B. and Pence, K. (2008), "Do borrowers know their mortgage terms?", J*ournal of Urban Economics*, 64(2), 218-233.

Campbell, J. (2006), "Household Finance," *Journal of Finance* 61, 1553-1604.

Christelis, D., Tullio J. and Padula, M. (2010), "Cognitive abilities and portfolio choice," *European Economic Review* 54, pp. 18-38.

Courchane, M. and Zorn, P. (2005), "Consumer Literacy & Credit Worthiness", Prepared for Federal Reserve System's Community Affairs Research Conference.

Disney, R., Bridges, S. and Gathergood, J. (2008), "Drivers of Over-indebtedness". Centre for Policy Evaluation.

European Commission (2008), "Towards a Common Operational European Definition of Over-Indebtedness", Report of the Directorate-General for Employment, Social Affairs and Equal Opportunities.

European Commission (2009), "Public Consultation on Responsible Lending and Borrowing in the EU", Internal Market and Services DG.

FSA (2006) "Levels of Financial Capability in the UK: Results of a baseline survey", Consumer Research 47.

FINRA (2009), "National Financial Capability Study". Available at http://www.finrafoundation.org/programs/capability/index.htm

Fondeville, N., Őzdemir, E. and Ward, T. (2010), "Over-indebtedness: New evidence from the EU-SILC special module", Research note n.º 4. European Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities.

Fornero, E., Monticone, C. and Trucchi, S. (2011), "The Effect of Financial Literacy on Mortgage Choices" Netspar Discussion Paper No. 09/2011-085.

Frade, C., Lopes, C, Jesus, F. and Ferreira, T. (2008), "Um perfil dos sobreendividados em Portugal", Centro de Estudos Sociais.

Friedman, M. (1957), "The Permanent Income Hypothesis", in A THEORY OF THE CONSUMPTION FUNCTION, Princeton: Princeton University, ISBN: 0-691-04182-2, , pp. 20 - 37

Gathergood, J. (2011), "Self-Control, Financial Literacy and Consumer over-Indebtedness". *Journal of Economic Psychology*, Volume 33, Issue 3, June 2012, pp. 590–602.

Gathergood, J. and Disney, R. (2011), "Financial Literacy and Indebtedness: New Evidence for UK Consumers", Discussion Papers 11/05, University of Nottingham, Centre for Finance, Credit and Macroeconomics (CFCM).

Gerardi, K.; Goette, L. and Meier, S. (2010), "Financial Literacy and Subprime Mortgage Delinquency: Evidence from a Survey Matched to Administrative Data", Federal Reserve Bank of Atlanta Working Paper Series n. 2010-10.

Haas, O. J. (2006) "Over-indebtedness in Germany", Employment Section, Social Finance Program Working Paper n.º 44, International Labour Office.

Hilgert, M. A., Hogarth, J. and Beverly, S. (2003), "Household Financial Management: The Connection between Knowledge and Behavior," Federal Reserve Bulletin, Board of Governors of the Federal Reserve System (U.S.), issue Jul, 309-322.

Hung, A. Parker, A. M. and Yoong, J. (2009) "Defining and Measuring Financial Literacy" RAND Working Paper Series WR-708.

Huston, S. J. (2010), "Measuring Financial Literacy", *Journal of Consumer Affairs*, Vol. 44: n. º 2, pp. 296–316.

Johnson, E. and Sherraden, M. S. (2007),"From Financial Literacy to Financial Capability Among Youth", *Journal of Sociology and Social Welfare*, volume XXXIV, n.3.

Keeney, M. J. and O'Donnell, N. (2009), "Financial Capability: New Evidence for Ireland," Research Technical Papers 1/RT/09

Kempson, E., Collard, S. and Moore, N. (2005) "Measuring financial capability: an exploratory study". Financial Services Authority, Consumer Research Report 37.

Lusardi, A. and Mitchell, O. S. (2006), "Financial Literacy and Planning: Implications for Retirement Wellbeing," Working Paper, Pension Research Council, Wharton School, University of Pennsylvania.

Lusardi, A. and Mitchell, O. S. (2009), "How ordinary consumers make complex economic decisions: financial literacy and retirement readiness", NBER Working Paper n.15350.

Lusardi, A. and Mitchell, O. S. (2011) "Financial Literacy around the World: An Overview" NBER Working Paper n.17107.

Lusardi, A. and Tufano, P. (2009), "Debt literacy, financial experiences and overindebtedness", NBER Working Paper n.14808.

Mandell, L. and Klein, L. S. (2009) "The Impact of Financial Literacy Education on Subsequent Financial Behavior", *Journal of Financial Counseling and Planning* Volume 20, Issue 1.

McCarthy, Y. (2011), "Behavioural characteristics and financial distress", European Central Bank Working Paper Series n. 1303.

McKay, S. (2011), "Understanding Financial Capability in Canada: Analysis of the Canadian Financial Capability Survey". Research paper prepared for the Task Force on Financial Literacy, February 9, 2011

Miles, D. (2004), "The UK Mortgage Market: Taking a Longer-Term View". Final Report and Recommendations, HM Treasury ISBN: 1-84532-004-2.

Modigliani, F. and Brumberg, R. (1954), "Utility analysis and the consumption function: an interpretation of cross-section data," in Kenneth K. Kurihara, ed., POST KEYNESIAN ECONOMICS, New Brunswick, NJ. Rutgers University Press, 388–436.

Moore, D. (2003), "Survey of Financial Literacy in Washington State: Knowledge, Behavior, Attitudes, and Experiences" Commissioned by Washington State Department of Financial Institutions, Technical Report 03-39.

O'Connell, A. (2007), "Measuring the effectiveness of financial education", mimeo prepared for the Commission for Financial Literacy and Retirement Income.

OECD (2005), "Improving Financial Literacy: Analysis of Issues and Policies", ISBN 92-64-012567.

OECD (2009), "Financial Literacy and Consumer Protection: Overlooked Aspects of the Crisis", OECD Recommendation on Good Practices on Financial Education and Awareness Relating to Credit.

PACFL (2008), "President's Advisory Council on Financial Literacy: Annual Report to the President 2008".

Remund, D. L. (2010), "Financial Literacy Explicated: The Case for a Clearer Definition in an Increasingly Complex Economy". *Journal of Consumer Affairs*, 44(2), 276-295.

Schagen, S. (1997) "The Evaluation of NatWest Face 2 Face with Finance", National Foundation for Educational Research (cited in ANZ (2011) "Survey of Adult Financial Literacy in Australia").

Stango, V. and Zinman, J. (2009), "Exponential Growth Bias and Household Finance". *Journal of Finance* 64(6): 2807-2849.

StataCorp. (2009) Stata: Release 11. Statistical Software. College Station, TX: StataCorp LP.

van Rooij, M., Lusardi, A. and Alessie, R. (2007), "Financial Literacy and Stock Market Participation", NBER Working Papers n.13565.

van Rooij, M, Lusardi, A. and Alessie, R. (2009), "Financial Literacy and Retirement Planning in the Netherlands", DNB Working Papers 231, Netherlands Central Bank, Research Department.

van Rooij, M., Lusardi, A. and Alessie, R. (2011), "Financial Literacy, Retirement Planning, and Household Wealth", NBER Working Papers n.17339.

Vandone, D. (2009), CONSUMER CREDIT IN EUROPE: RISKS AND OPPORTUNITIES OF A DYNAMIC INDUSTRY, Springer-Verlag, ISBN 978-3-7908-2100-0.

Wooldridge, J. M. (1999), INTRODUCTORY ECONOMETRICS: A MODERN APPROACH, South-Western College Publishing, ISBN 0-538-85013-2.

8   Tables and Figures

Figure 1 - Household indebtedness as a percentage of nominal disposable income
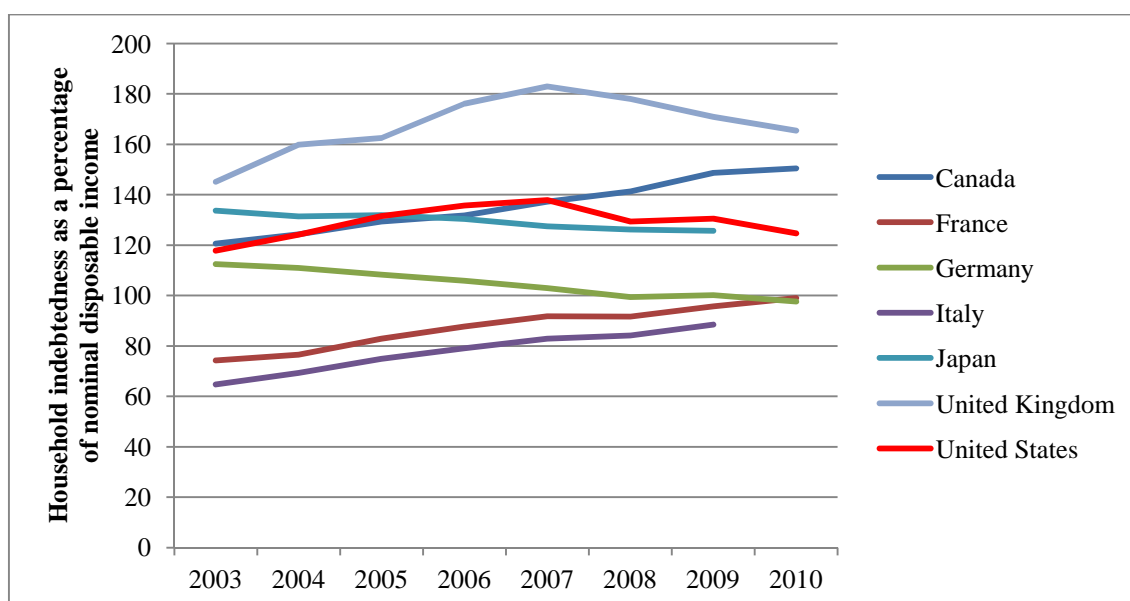
Source: OECD Economic Outlook No. 90, OECD Economic Outlook: Statistics and Projections (database).

Table 1 - Household indebtedness as a percentage of nominal disposable income (variation)

	2004	2005	2006	2007	2008	2009	2010
Canada							
Liabilities	0.03	0.04	0.02	0.04	0.03	0.05	0.01
of which: Mortgages	0.03	0.04	0.02	0.05	0.03	0.05	0.02
France							
Liabilities	0.03	0.08	0.05	0.05	0.00	0.04	0.03
of which: LT loans	0.05	0.08	0.06	0.05	0.04	0.16	
Germany							
Liabilities	-0.01	-0.02	-0.02	-0.03	-0.04	0.01	-0.03
of which: Mortgages	-0.01	-0.01	0.00	-0.02	-0.04	0.01	
Italy							
Liabilities	0.07	0.08	0.05	0.05	0.01	0.05	..
of which: MLT loans	0.09	0.09	0.05	0.05	0.01	0.06	..
Japan							
Liabilities	-0.02	0.00	-0.01	-0.02	-0.01	0.00	..
of which: Mortgages	-0.01	0.01	0.02	-0.01	0.00	0.01	..
United Kingdom							
Liabilities	0.09	0.02	0.08	0.04	-0.03	-0.04	-0.03
of which: Mortgages	0.10	0.02	0.07	0.05	-0.01	-0.02	..
United States							
Liabilities	0.05	0.06	0.03	0.02	-0.07	0.01	-0.05
of which: Mortgages	0.07	0.08	0.04	0.02	-0.06	0.01	-0.07

Source: OECD Economic Outlook No. 90, OECD Economic Outlook: Statistics and Projections (database).

Table 2 - Socioeconomic characteristics of respondents and over-indebted respondents

				FINSTRESS		ARREARS		FORECLOSURE	
		N	%	N	%	N	%	N	%
		28146	100	17008	100	2296	100	806	100
Gender									
	Female	14978	53.2	9631	56.6	1350	58.8	445	55.2
	Male	13168	46.8	7377	43.4	946	41.2	361	44.8
Age									
	18-24	3285	11.7	2205	13.0	95	4.1	67	8.3
	25-34	4934	17.5	3161	18.6	415	18.1	186	23.1
	35-44	5400	19.2	3498	20.6	630	27.4	225	27.9
	45-54	5907	21.0	3812	22.4	655	28.5	183	22.7
	55-64	4543	16.1	2487	14.6	369	16.1	108	13.4
	65 or more	4077	14.5	1845	10.8	132	5.7	37	4.6
Race									
	Non-White	6900	24.5	4573	26.9	634	27.6	281	34.9
	White	21246	75.5	12435	73.1	1662	72.4	525	65.1
Region									
	Midwest	6518	23.2	3857	22.7	528	23.0	197	24.4
	Northeast	5104	18.1	3072	18.1	394	17.2	135	16.7
	South	9570	34.0	5830	34.3	839	36.5	271	33.6
	West	6954	24.7	4249	25.0	535	23.3	203	25.2
Marital Status									
	Married	15856	56.3	8827	51.9	1635	71.2	479	59.4
	Single	7209	25.6	4699	27.6	302	13.2	173	21.5
	Divorced/Separated/Widowed	5081	18.1	3482	20.5	359	15.6	154	19.1
Education									
	Did not complete high school	805	2.9	639	3.8	50	2.2	24	3.0
	High school graduate	6722	23.9	4617	27.1	564	24.6	219	27.2
	Some college	9895	35.2	6409	37.7	881	38.4	318	39.5
	College graduate	6807	24.2	3643	21.4	548	23.9	176	21.8
	Post graduate education	3917	13.9	1700	10.0	253	11.0	69	8.6
Dependent children									
	No dependent children	16964	60.3	9390	55.2	888	38.7	333	41.3
	With children	11182	39.7	7618	44.8	1408	61.3	473	58.7

Table 2 - Socioeconomic characteristics of respondents and over-indebted respondents (cont.)

	N	%	FINSTRESS N	%	ARREARS N	%	FORECLOSURE N	%
	28146	100	17008	100	2296	100	806	100
Household income								
Less than $15K	3589	12.8	2848	16.7	92	4.0	75	9.3
$15-25K	3424	12.2	2720	16.0	201	8.8	115	14.3
$25-35K	3455	12.3	2516	14.8	279	12.2	120	14.9
$35-50K	4505	16.0	2934	17.3	494	21.5	172	21.3
$50-75K	5394	19.2	2997	17.6	575	25.0	166	20.6
$75-100K	3296	11.7	1571	9.2	329	14.3	89	11.0
$100 - 150K	2821	10.0	1056	6.2	238	10.4	48	6.0
$150K or more	1662	5.9	366	2.2	88	3.8	21	2.6
Employment status								
Employed	13535	48.1	7927	46.6	1240	54.0	386	47.9
Self-employed	2414	8.6	1477	8.7	279	12.2	104	12.9
Unemployed	2564	9.1	2028	11.9	233	10.1	101	12.5
Inactive	5006	17.8	3454	20.3	380	16.6	163	20.2
Retired	4627	16.4	2122	12.5	164	7.1	52	6.5
	N	%	N	%	N	%	N	%
	27585	100	16705	100	2270	100	795	100
Drop in income								
Yes	10956	39.7	8813	52.8	1389	61.2	528	66.4
No	16629	60.3	7892	47.2	881	38.8	267	33.6
	N	%	N	%	N	%	N	%
	17199	100	9099	100	2296	100	409	100
Homeowner with mortgage								
Yes	11780	68.5	6741	74.1	2296	100	376	91.9
No	5419	31.5	2358	25.9	..	..	33	8.1
	N	%	N	%	N	%	N	%
	11322	100	6741	100	2296	100	376	100
Mortgage type								
ARM	1160	10.2	766	11.4	368	16.0	80	21.3
FRM	10162	89.8	5670	84.1	1820	79.3	287	76.3

Table 3- Financial literacy: responses to questions

Weighted percentages of total number of respondents (N= 28146)

	Interest rate question	Inflation question	Bond price question	Mortgage question	Risk question
Correct	79.9	67.7	29.8	78.7	56.4
Incorrect	9.6	13.1	32.1	8.2	5.3
Don't know	9.2	17.5	36.7	12.4	37.3
Prefer not to say	1.3	1.6	1.5	0.7	1.0

Figure 2 – Distribution of responses to financial literacy questions
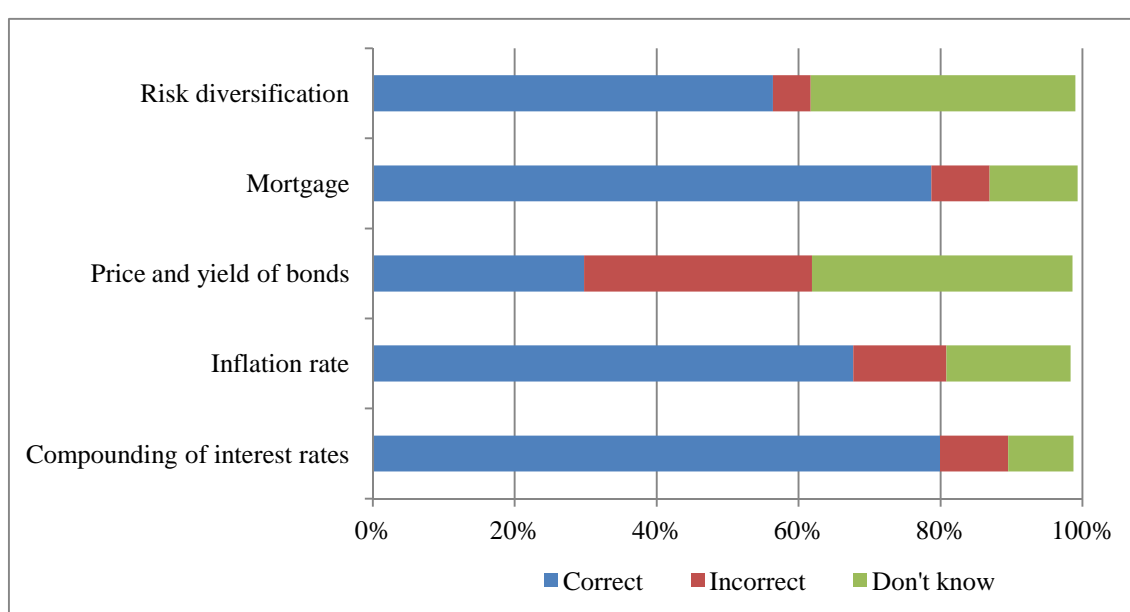
Note: Correct, incorrect and don't know responses to do not sum up to 100% because of refusals.

Table 4 - Financial literacy: number of correct, incorrect and don't know answers

Weighted percentages of total number of respondents (N= 28146)

	None	1	2	3	4	All	Mean
Correct	5.6	9.4	15.6	23.2	28.8	17.4	3.12
Incorrect	51.3	33.6	11.3	3.0	0.6	0.1	0.68
Don't know	43.2	25.5	16.5	7.7	4.2	3.0	1.13

Note: Categories do not sum up to 100% because of rounding and means do not sum up to 5 due to refusals.

Table 5 – Financial Literacy Index

FL INDEX	Number of observations	Frequency	Cumulated frequency
0.0	1583	0.056	0.056
0.2	2645	0.094	0.150
0.4	4387	0.156	0.306
0.6	6517	0.232	0.538
0.8	8108	0.288	0.826
1.0	4906	0.174	1.000
Total	28146		
Mean		0.625	
Median		0.6	
Mode		0.8	
Standard deviation		0.283	

Figure 3 – FL INDEX Frequency
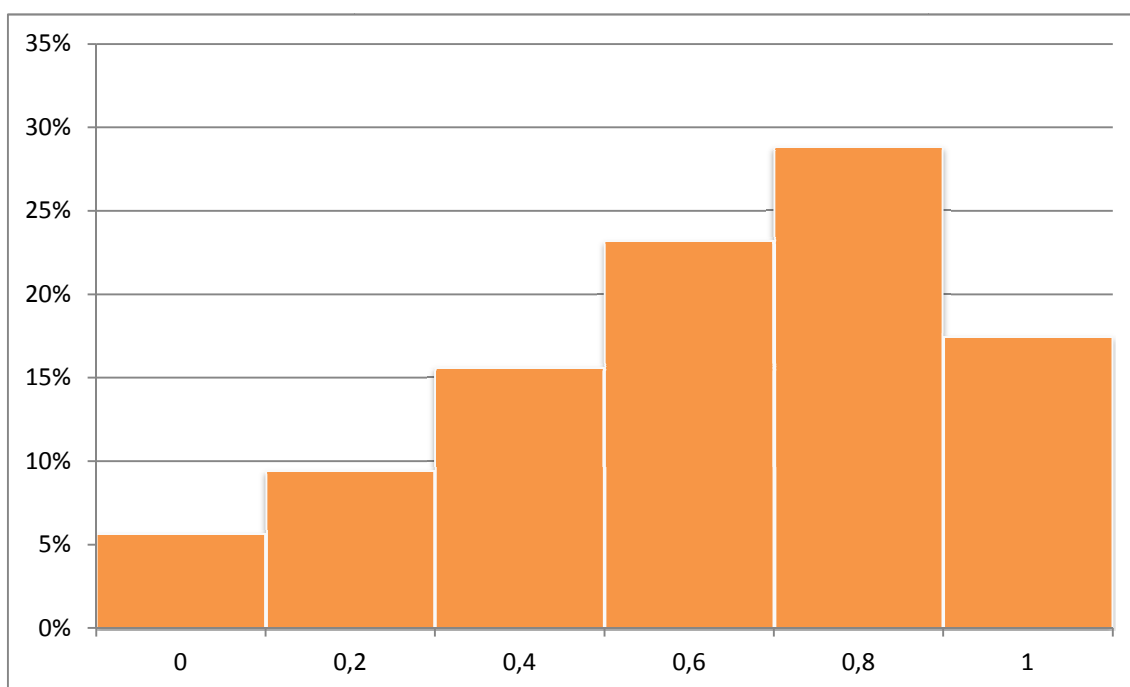
Table 6 – FL INDEX and FB INDEX (socioeconomic characteristics)

		FL INDEX		FB INDEX	
		Mean	Standard deviation	Mean	Standard deviation
Gender					
	Female	0.562	0.283	0.605	0.173
	Male	0.696	0.267	0.619	0.172
Age					
	18-24	0.492	0.281	0.516	0.165
	25-34	0.575	0.283	0.587	0.181
	35-44	0.635	0.279	0.604	0.177
	45-54	0.652	0.276	0.617	0.173
	55-64	0.683	0.266	0.644	0.165
	65 or more	0.674	0.277	0.648	0.144
Race					
	Non-White	0.552	0.289	0.572	0.181
	White	0.648	0.277	0.622	0.168
Region					
	Midwest	0.635	0.281	0.616	0.172
	Northeast	0.632	0.284	0.620	0.164
	South	0.605	0.288	0.606	0.173
	West	0.638	0.278	0.608	0.177
Marital Status					
	Married	0.665	0.273	0.637	0.167
	Single	0.554	0.291	0.556	0.175
	Divorced/Separated/Widowed	0.600	0.282	0.583	0.167
Education					
	Did not complete high school	0.378	0.271	0.505	0.167
	High school graduate	0.497	0.282	0.562	0.164
	Some college	0.614	0.270	0.589	0.174
	College graduate	0.706	0.256	0.635	0.167
	Post graduate education	0.779	0.228	0.675	0.158
Household income					
	Less than $15K	0.462	0.288	0.469	0.148
	$15-25K	0.521	0.276	0.516	0.157
	$25-35K	0.565	0.277	0.548	0.163
	$35-50K	0.610	0.271	0.580	0.165
	$50-75K	0.668	0.261	0.624	0.159
	$75-100K	0.721	0.250	0.654	0.159
	$100 - 150K	0.761	0.237	0.695	0.149
	$150K or more	0.794	0.231	0.731	0.139
Employment status					
	Employed	0.625	0.276	0.605	0.175
	Self-employed	0.683	0.270	0.629	0.177
	Unemployed	0.539	0.295	0.545	0.179
	Inactive	0.529	0.283	0.545	0.165
	Retired	0.673	0.272	0.643	0.148
Dependent children					
	No dependent children	0.63	0.280	0.616	0.166
	With children	0.609	0.285	0.592	0.180
Drop in income					
	Yes	0.606	0.281	0.578	0.178
	No	0.646	0.279	0.631	0.166
Homeowner with mortgage					
	Yes	0.696	0.254	0.645	0.166
	No	0.660	0.280	0.646	0.152
Mortgage type					
	ARM	0.707	0.255	0.621	0.169
	FRM	0.707	0.245	0.650	0.165

Table 7– Financial behaviour: responses to questions

Weighted percentages of total number of respondents (N= 28,146)

| | Spending control | Overdraw checking account | Save for retirement | Rainy day fund | Pay credit card in full | Taken payday loan | Health insurance | Financial advice | |
								Saving/ investment	Mortgage/ loan
Yes	0.77	0.24	0.43	0.37	0.31	0.09	0.81	0.32	0.27
No	0.20	0.67	0.53	0.60	0.43	0.90	0.18	0.66	0.71
Don't know	0.03	0.01	0.03	0.02	0.01	0.00	0.01	0.01	0.01
Prefer not to say	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
NA	-	0.08[a]	-	-	0.25[b]	-	-	-	-

(a)   Total of respondents with no checking account

(b)   Total of respondents with no credit cards

Figure 4 – Distribution of responses to financial behaviour questions
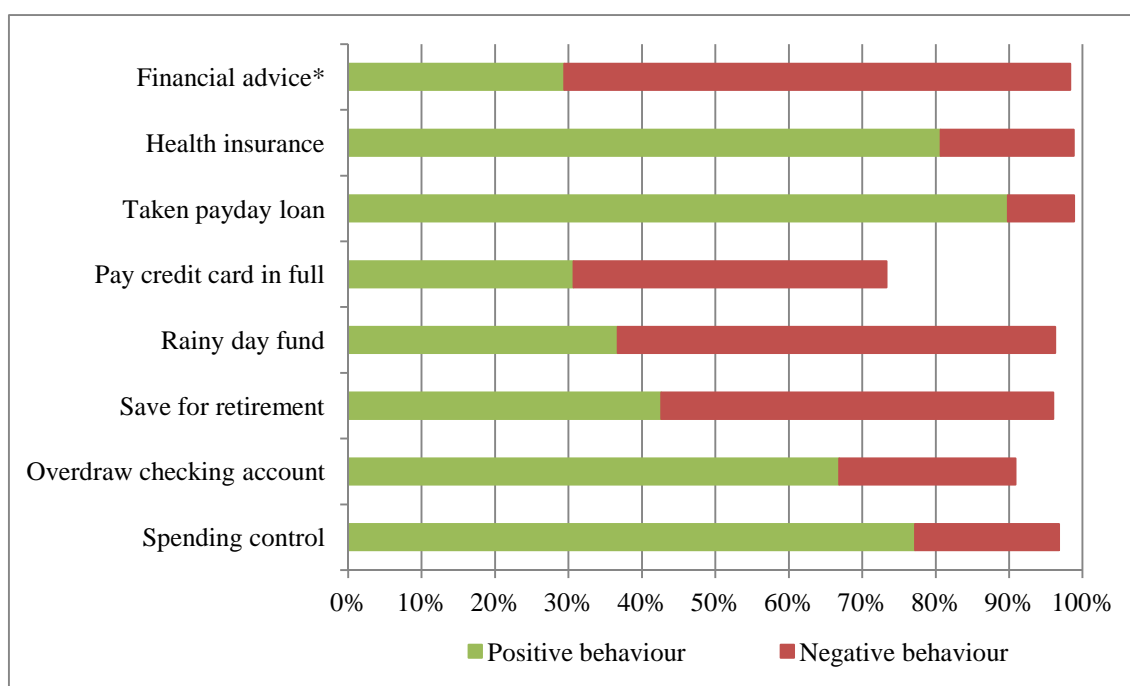
*Average of financial advice on saving/investment and financial advice on loan/mortgage.

Note: "Positive behaviour" and "Negative behaviour" responses to do not sum up to 100% because of refusals and not applicable cases.

Table 8 – Financial Behaviour Index

FB INDEX	Number of observations	Frequency	Cumulated frequency
0	3	0.000	0.000
0.1	45	0.002	0.003
0.2	285	0.015	0.018
0.3	990	0.054	0.072
0.4	2050	0.111	0.183
0.5	3199	0.174	0.174
0.6	3873	0.210	0.567
0.7	3794	0.206	0.772
0.8	2806	0.152	0.925
0.9	1197	0.065	0.990
1	191	0.010	1.000
Total	18433	1	

Mean	0.611
Median	0.6
Mode	0.6
Standard deviation	0.172

Figure 5 – FB Index Frequency
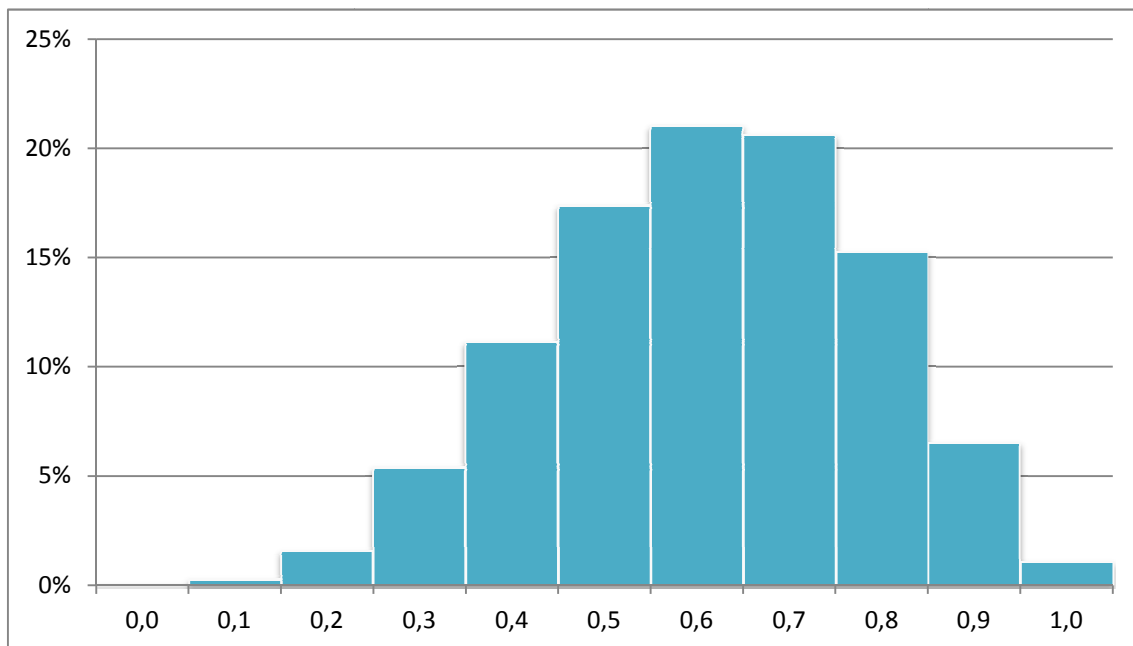
Table 9 – Over-indebtedness: responses to questions

Weighted percentages of total number of respondents

(N=28146 for financial distress and foreclosure and N=11780 for arrears)

	Financial distress	Arrears[a]	Foreclosure
Yes	0.60[b]	0.19 [c]	0.03
No	0.38	0.78	0.96
Don't know	0.01	0.02	0.00
Prefer not to say	0.01	0.01	0.01

(a) This question is only applicable to respondents with a mortgage in a total of 11780 individuals.

(b) 17% reported major difficulties and 43% some difficulties.

(c) 7% reported having been late once and 12% more than once.

Figure 6 - Distribution of responses to over-indebtedness questions
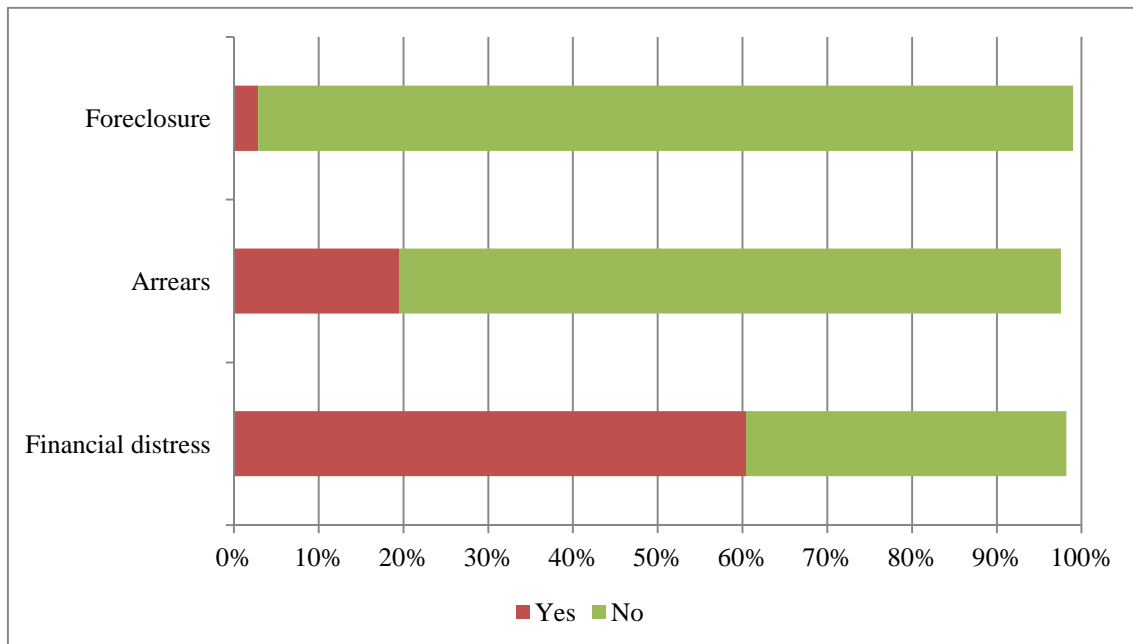
Note: Categories do not sum up to 100% because of don't' know answers and refusals

Figure 7 – Financial Literacy Index by Gender, Race and Age
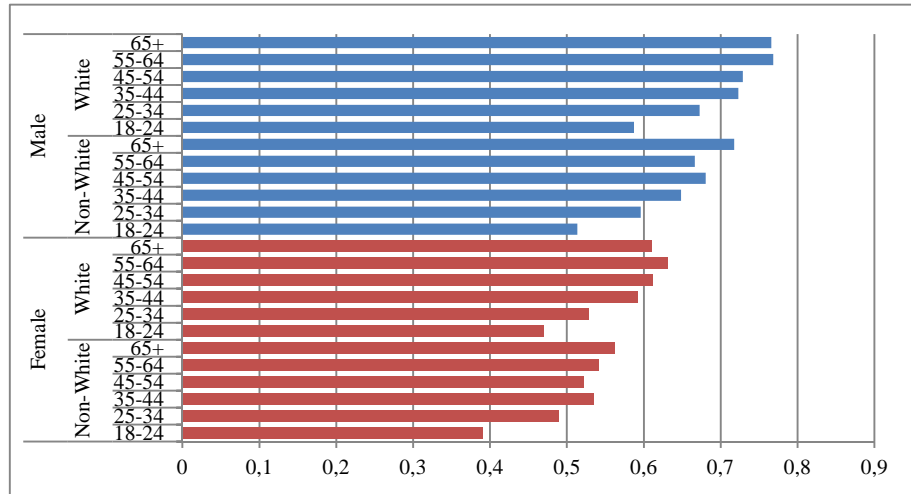
Figure 9 – Financial Behaviour Index by Gender, Race and Age
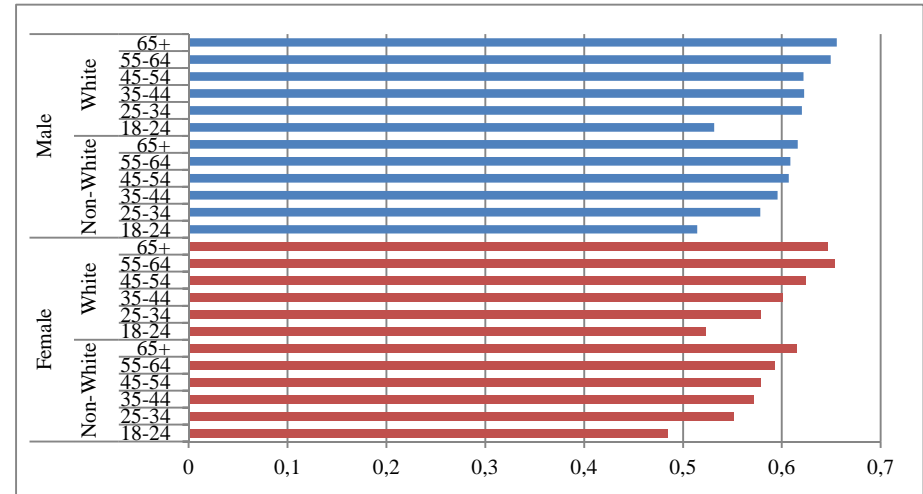
Figure 8 – Financial Literacy Index by Education and Income
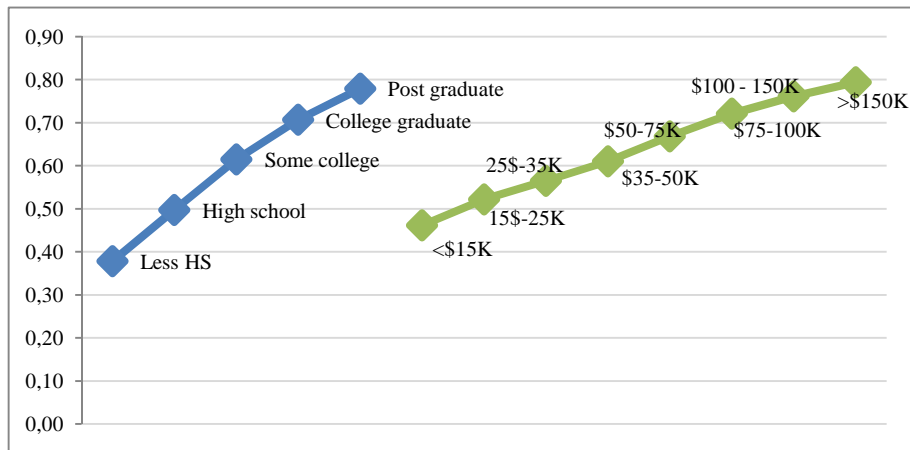
Figure 10 – Financial Behaviour Index by Education and Income
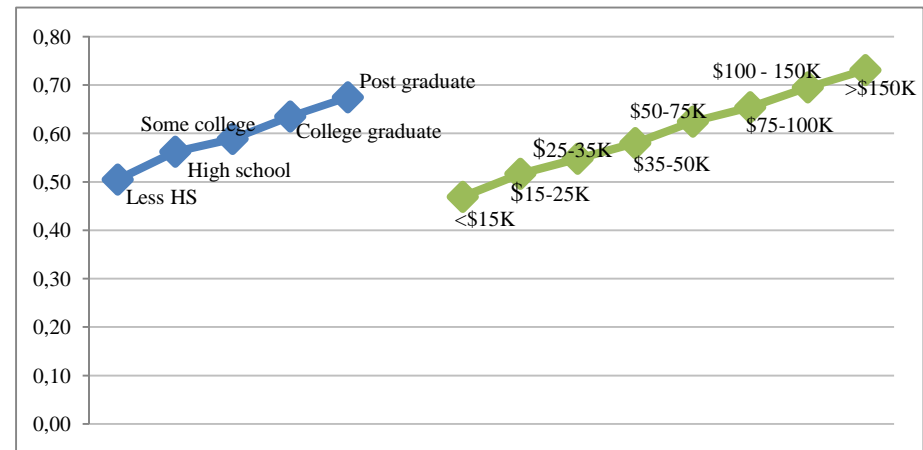
Table 10 – Over-indebtedness measures: summary statistics

	Mean	Standard Deviation	Total	Answers
FINSTRESS	0.615	0.487	17008	27644
ARREARS	0.200	0.400	2296	11494[a]
FORECLOSURE	0.029	0.168	806	27869

(a) This questions is only applicable to respondents with a mortgage in a total of 11780 individuals

Table 11 – Over-indebtedness measures: FL INDEX and FB INDEX

	FINANCIAL DISTRESS	ARREARS	FORECLOSURE	TOTAL SAMPLE
FL INDEX				
Mean	0.587	0.632	0.575	0.625
Median	0.6	0.6	0.6	0.6
Mode	0.8	0.8	0.6	0.8
Std. Dev.	0.282	0.258	0.264	0.283
Skewness[a]	-0.384	-0.486	-0.278	-0.525
Kurtosis[b]	2.309	2.621	2.457	2.443
Observations	17008	2296	806	28146
FB INDEX				
Mean	0.549	0.544	0.523	0.611
Median	0.5	0.5	0.5	0.6
Mode	0.5	0.5	0.5	0.6
Std. Dev.	0.169	0.169	0.185	0.172
Skewness[a]	0.059	0.154	-0.030	-0.200
Kurtosis[b]	2.675	2.754	2.546	2.587
Observations	10014	1460	409	18433

(a) The skewness of a symmetric distribution, such as the normal distribution, is zero. Positive skewness means that the distribution has a long right tail and negative skewness implies that the distribution has a long left tail.

(b) The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal; if the kurtosis is less than 3, the distribution is flat (platykurtic) relative to the normal.

Figure 11 - Over-indebtedness measures: FL INDEX Frequency
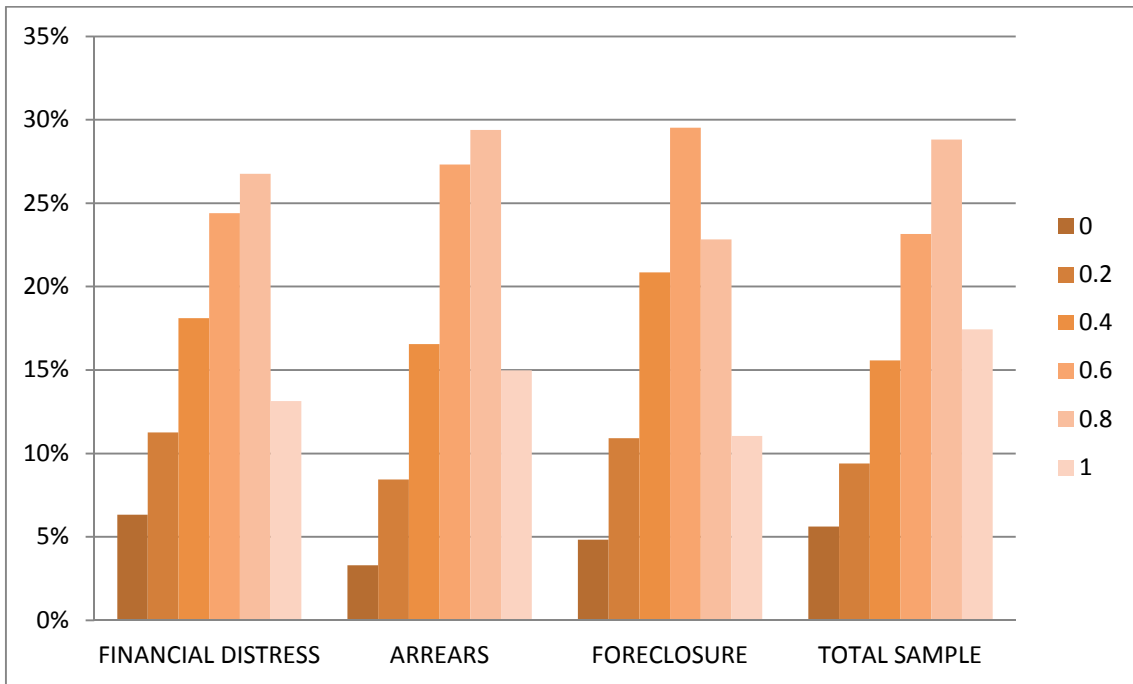
Figure 12 - Over-indebtedness measures: FB INDEX Frequency
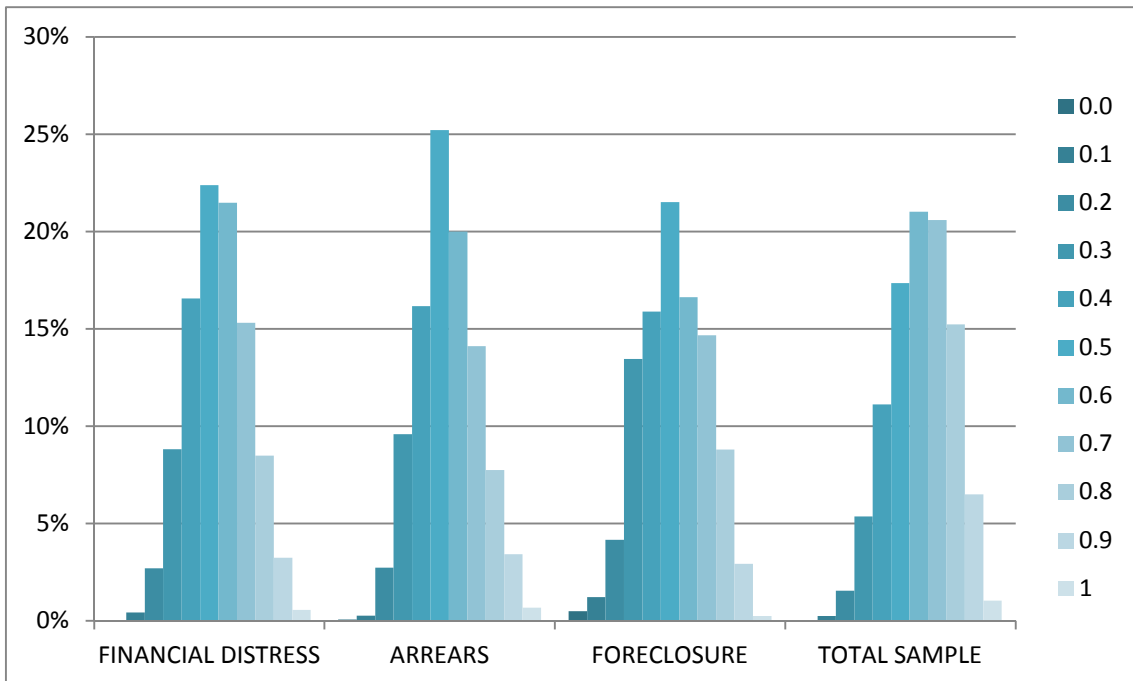
Table 12 –Independent variables

Variable	Description	Mean	Standard Deviation	Total	Answers
MALE	Dummy variable taking a value of 1 if the individual is male and 0 if female.	0.468	0.499	13168	28146
AGE [35-54]	Dummy variable taking a value of 1 if the individual is between 35 and 54 years and 0 otherwise.	0.402	0.490	11307	28146
AGE [55+]	Dummy variable taking a value of 1 if the individual is 55 years old or more and 0 otherwise.	0.306	0.461	8620	28146
WHITE	Dummy variable taking a value of 1 if the individual is White and 0 otherwise.	0.755	0.430	21246	28146
SOUTH	Dummy variable taking a value of 1 if the individual is from the South of the US and 0 otherwise (Midwest; Northeast and West).	0.340	0.474	9570	28146
CHILDREN	Dummy variable taking a value of 1 if the individual has financially dependent children and 0 otherwise.	0.397	0.489	11182	28146
D/S/W	Dummy variable taking a value of 1 if the individual is divorced, separated or widowed and 0 otherwise.	0.181	0.385	5081	28146
MARRIED	Dummy variable taking a value of 1 if the individual is married and 0 otherwise.	0.563	0.496	15856	28146
COLLEGE	Dummy variable taking a value of 1 if the individual has a college education (college graduate or post graduate education) and 0 otherwise (did not complete high school, high school graduate or has some college).	0.381	0.486	10724	28146
INC2	Dummy variable taking a value of 1 if the household annual income is at least $25,000 but less than $50,000 and 0 otherwise.	0.283	0.450	7960	28146
INC3	Dummy variable taking a value of 1 if the household annual income is at least $50,000 but less than $100,000 and 0 otherwise.	0.309	0.449	8690	28146
INC4	Dummy variable taking a value of 1 if the household annual income is above $100,000 and 0 otherwise.	0.159	0.366	4483	28146
UNEM-PLOYED	Dummy variable taking a value of 1 if the individual is unemployed and 0 otherwise.	0.091	0.288	2564	28146
SELF-EMPLOYED	Dummy variable taking a value of 1 if the individual is self-employed and 0 otherwise.	0.086	0.280	2414	28146
INACTIVE	Dummy variable taking a value of 1 if the individual is inactive (full-time student, homemaker, permanently sick, disabled, or unable to work) and 0 otherwise.	0.178	0.382	5006	28146
RETIRED	Dummy variable taking a value of 1 if the individual is retired and 0 otherwise.	0.164	0.371	4627	28146
ARM	Dummy variable taking a value of 1 if the individual currently has an ARM and 0 if an FRM.	0.102	0.303	1160	11322
DROP INCOME	Dummy variable taking a value of 1 if the individual has experienced a large drop in income last year and 0 otherwise.	0.397	0.489	10956	27585
FL INDEX	Financial Literacy Index	0.625	0.263	-	28146
FB INDEX	Financial Behaviour Index	0.611	0.172	-	18433

Table 13 – Probit model results of over-indebtedness measures (marginal effects)

Dependent variable	FINSTRESS				ARREARS				FORECLOSURE			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
MALE [1]	-0.05***	-0.04***	-0.03***	-0.04***	-0.03***	-0.02***	-0.02**	-0.02**	0.00	0.00	0.01**	0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
AGE (35-54) [2]	0.06***	0.05***	0.05***	0.04**	0.02**	0.01	0.02*	0.01	-0.01**	-0.01***	-0.01**	-0.01**
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
AGE (55 or more) [2]	0.06***	0.04***	0.05***	0.06***	0.00	0.00	0.00	0.01	-0.01***	-0.01***	-0.01**	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
WHITE [3]	-0.02*	0.00	0.00	0.01	-0.08***	-0.07***	-0.07***	-0.07***	-0.02***	-0.01***	-0.01***	-0.01***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
SOUTH [4]	-0.02**	-0.01	-0.01	-0.03**	0.02***	0.03***	0.02***	0.01	-0.00	0.00	0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
CHILDREN [5]	0.14***	0.13***	0.13***	0.12***	0.09***	0.08***	0.08***	0.06***	0.02***	0.01***	0.01***	0.01***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
D/S/W [6]	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.02	-0.02	-0.01*	-0.01*	-0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
MARRIED [6]	0.01	0.00	0.00	0.00	-0.02	-0.02*	-0.02*	-0.01	-0.02***	-0.01***	-0.01***	-0.01*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
COLLEGE [7]	-0.06***	-0.05***	-0.04***	-0.02	-0.06***	-0.05***	-0.05***	-0.03***	-0.01***	-0.01***	0.00*	-0.00
	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
INC2 [8]	-0.21***	-0.22***	-0.21***	-0.18***	-0.04***	-0.04***	-0.03***	-0.01	-0.01**	-0.01*	-0.01*	-0.01*
	(0.03)	(0.03)	(0.03)	(0.04)	(0.01)	(0.01)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.0)
INC3 [8]	-0.40***	-0.38***	-0.37***	-0.30***	-0.12***	-0.10***	-0.09***	-0.02	-0.02***	-0.01***	-0.01***	-0.01**
	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
INC4 [8]	-0.58***	-0.56***	-0.54***	-0.44***	-0.18***	-0.15***	-0.14***	-0.05***	-0.03***	-0.02***	-0.02***	-0.01**
	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
SELF-EMPLOYED [9]	0.06***	-0.01	-0.01	0.00	0.06***	0.03**	0.03**	0.03***	0.02***	0.21***	0.01***	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.08)	(0.01)	(0.00)
UNEMPLOYED [9]	0.14***	-0.01	-0.01	-0.02	0.07***	0.00	0.00	0.00	0.02***	0.00	0.00	0.00
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
RETIRED [9]	-0.11***	-0.11***	-0.11***	-0.01***	-0.09***	-0.09***	-0.09***	-0.06***	-0.01	-0.01	-0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
INACTIVE [9]	-0.01	-0.02	-0.02	-0.04**	-0.01	-0.01	-0.01	-0.02*	0.01	0.00	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
ARM [10]	0.10***	0.10***	0.10***	0.10***	0.13***	0.12***	0.12***	0.08***	0.03***	0.03***	0.03***	0.02***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
DROP IN INCOME [11]		0.30***	0.30***	0.30***		0.14***	0.14***	0.11***		0.03***	0.03***	0.02***
		(0.01)	(0.01)	(0.03)		(0.01)	(0.01)	(0.01)		(0.00)	(0.00)	(0.00)
FL INDEX			-0.11***	-0.04			-0.09***	-0.05***			-0.02***	-0.02***
			(0.02)	(0.03)			(0.02)	(0.02)			(0.01)	(0.00)
FB INDEX				-0.95***				-0.39***				-0.04***
				(0.04)				(0.02)				(0.01)
N	11232	11143	11143	8989	11128	11030	11030	8949	11271	11167	11167	9009
Wald Chi2	1549.40	2151.35	2157.23	2024.86	928.36	1201.09	1218.95	988.15	232.87	288.90	302.85	215.00
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R^2	0.1177	0.1715	0.1731	0.2128	0.0939	0.1240	0.1268	0.1507	0.0807	0.1025	0.1082	0.1236
LR test	50.73	27.05	31.46	34.49	33.81	27.27	24.72	38.91	34.84	30.65	30.45	29.62
Prob > chi2	0.0000	0.0781	0.0359	0.0006	0.0089	0.0741	0.1699	0.0068	0.0065	0.0316	0.0464	0.0762

Notes: (1) Omitted categories for dummy variables: 'Female'. (2) Omitted categories for dummy variable: 'Age 18-34'. (3) Omitted categories for dummy variable: 'Non-white'. (4) Omitted categories for dummy variable: 'Midwest, Northeast and West'. (5) Omitted categories for dummy variable: 'No children'. (6) Omitted categories for dummy variables: 'Single'. (7) Omitted categories for dummy variable: 'No college'. (8) Omitted categories for dummy variables: 'INC1 – annual income below 25,000$'. (9) Omitted categories for dummy variables: 'Employed'. (10) Omitted categories for dummy variable: 'Fixed-Mortgage Rate'. (11) Omitted categories for dummy variable: 'No drop in income'.

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level. Robust standard errors in brackets.