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Financial Literacy, Financial Behaviour and Individuals' Over-indebtedness

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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, we consider three self-reported measures of over-indebtedness: financial distress, arrears and foreclosure. Using the data from the National Financial Capability Study carried out in the United States in 2009, we have defined three measures of over-indebtedness – financial distress, arrears and foreclosure –, and constructed a financial literacy index and a financial behaviour index. The 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.

Results show that gender matters for the intensity of over-indebtedness. Men have higher probability of experience financial distress or being in arrears but have lower probability of getting involved in a foreclosure process. In addition to the impact of socioeconomic factors, we conclude 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. Also, individuals who engage in positive financial behaviours, such as spending less than their own income, setting a 'rainy day' fund, using credit wisely or looking for financial advice, are less likely to experience severe financial difficulties. Independently of the level of financial literacy and of financial behaviour, experiencing a large drop in income is an important determinant of over-indebtedness.

JEL Classification: C25, D12, D14

Keywords: Personal Finance, Over-indebtedness, financial behaviour, financial literacy.

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. 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.

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 studying this relationship for the USA 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, we analyse whether financial literacy 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, we 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.

We use the data from the National Financial Capability Study, carried out in the United States in 2009, to undertake our 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. We 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. We 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 and over-indebtedness is examined. Section 3 describes the data used and the socioeconomic characteristics of the sample. The definition of the variables used, the model and the 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.

1 Literature review

Measuring the financial literacy level of the population is important in order to identify potential needs and gaps, as well as identifying groups at risk¹. Yet, different researchers and organizations have defined and measured financial literacy in many different ways². Building on the OECD (2005) definition of “financial education”³, 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

¹ 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)).

² See Remund (2010) and Hung et al. (2009) for a review of conceptual and operational definitions.

³ “*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*”.

the individual, the United Kingdom⁴, Canada⁵ and the United States⁶ have adopted the term “financial capability” 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). For instance, financial literacy, has been widely measured using the three simple questions on compounding of interest rates, inflation and risk diversification originally designed by Lusardi and Mitchell (2006)⁷ for the U.S. Health and Retirement Study⁸. In the pilot study of the OECD, and its International Network for Financial Education (INFE), financial literacy is measured considering its three components: knowledge; behaviour and attitudes (Atkinson and Messy (2011), (2012)). 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 also follows this approach as the questions used to construct the financial literacy index are aimed at evaluating objective knowledge.

⁴ HM Treasury and Financial Services Authority (FSA).

⁵ Financial Consumer Agency of Canada.

⁶ U.S. Department of the Treasury.

⁷ 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.

⁸ 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.

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), Courchane and Zorn (2005)). 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 that financial illiteracy affects borrowing behaviour leading to higher debt levels at higher cost (Moore (2003)). Considering mortgage decisions, Campbell (2006) concludes that households choose between fixed rate mortgages (FRM) and adjustable rate mortgages (ARM) 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. The paper of Lusardi and Tufano (2009) finds a significant association between debt literacy⁹ 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), Gerardi et al. (2010)). 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

⁹ Debt literacy refers to the ability to make simple decisions regarding debt contracts and applying basic knowledge about interest compounding to everyday financial choices.

into arrears. In the same way, Gathergood (2011) empirically examines how financial literacy and self-control of individuals relates to over-indebtedness using the data from UK DebtTrack survey and conclude that individuals with higher financial literacy levels are less likely to experience over-indebtedness¹⁰.

The scarcer research on financial literacy and over-indebtedness might be explained by the inexistence of an agreed definition of over-indebtedness itself (European Commission (2008) and Disney et al. (2008)) despite the concern with the household's indebtedness levels which impose strains on household finances. Indeed, data from the Eurobarometer survey (conducted in December 2011)¹¹ 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 (21%) expressed difficulties in keeping up with household bills and credit commitments. In the United States, in the 2009 Panel Survey of Consumer Finances¹², 6 per cent of the households reported having been sixty or more days late on a required debt payment over the previous year. 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). Disney et al. (2008) consider that a criterion of 'over-indebtedness' based on current or prospective arrears is the most appropriate. Concerning the causes of over-indebtedness, literature typically identifies two types of over-indebtedness: "passive" and "active" (Anderloni and Vandone (2010), Banque de France (1996) and Vandone (2009)). The first is due to the existence of exogenous factors such as job loss, divorce or separation, illness or macroeconomic shocks variables. 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 e Ferreira (2008)). Disney et al. (2008) grouped the drivers of over-indebtedness into three categories: financial imprudence,

¹⁰ Both papers (McCarthy (2011) and Gathergood (2011)) analyse the impact of behaviour in a psychological perspective taking into account behavioural characteristics of individuals as impulsiveness, for example.

¹¹ Flash Eurobarometer 338 - http://ec.europa.eu/public_opinion/flash/fl_338_en.pdf

¹² http://www.federalreserve.gov/econresdata/scf/scf_2009psurvey.htm

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, (ii) under-insurance and (iii) relative price shocks. For the second group three principal sources of income shocks are identified: unemployment, divorce and illness. The final set accounts for macroeconomic shocks which include interest rates changes 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, 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)).

2 Data

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 PACFL¹³. We use the state-by-state online survey, with approximately 500 interviewed in each of the 50 states plus the District of Columbia, which was fielded between June-October, 2009¹⁴. The bulk of the survey questions are focused on eight financial topics. The first section covers habits and attitudes in managing household budget. The second section addresses the use of financial counselling related to debt, savings and investment, insurance and tax planning. The third section is devoted 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

¹³ 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.

¹⁴ Data retrieved from <http://www.finrafoundation.org/programs/capability/index.htm> in January, 2012.

final group of questions included in the survey 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 and number of children. Summary statistics of the sample are provided in Table 1.

The whole sample comprises 28,246 respondents, aged 18 years or older. 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 college (35%), 24% are college graduate and only 3% did not complete high school. 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.

Table 1 - Characteristics of respondents and over-indebted respondents

	TOTAL	FINSTRESS	ARREARS	FORECLOSURE
	%	%	%	%
<i>Gender</i>				
Female	53.2	56.6	58.8	55.2
Male	46.8	43.4	41.2	44.8
<i>Age</i>				
18-24	11.7	13.0	4.1	8.3
25-34	17.5	18.6	18.1	23.1
35-44	19.2	20.6	27.4	27.9
45-54	21.0	22.4	28.5	22.7
55-64	16.1	14.6	16.1	13.4
65 or more	14.5	10.8	5.7	4.6
<i>Race</i>				
Non-White	24.5	26.9	27.6	34.9
White	75.5	73.1	72.4	65.1
<i>Region</i>				
Midwest	23.2	22.7	23.0	24.4
Northeast	18.1	18.1	17.2	16.7
South	34.0	34.3	36.5	33.6
West	24.7	25.0	23.3	25.2
<i>Marital Status</i>				
Married	56.3	51.9	71.2	59.4
Single	25.6	27.6	13.2	21.5
Divorced/Separated/Widowed	18.1	20.5	15.6	19.1
<i>Education</i>				
Did not complete high school	2.9	3.8	2.2	3.0
High school graduate	23.9	27.1	24.6	27.2
Some college	35.2	37.7	38.4	39.5
College graduate	24.2	21.4	23.9	21.8
Post graduate education	13.9	10.0	11.0	8.6
<i>Dependent children</i>				
No dependent children	60.3	55.2	38.7	41.3
With children	39.7	44.8	61.3	58.7
<i>Household income</i>				
Less than \$15K	12.8	16.7	4.0	9.3
\$15-25K	12.2	16.0	8.8	14.3
\$25-35K	12.3	14.8	12.2	14.9
\$35-50K	16.0	17.3	21.5	21.3
\$50-75K	19.2	17.6	25.0	20.6
\$75-100K	11.7	9.2	14.3	11.0

\$100 - 150K	10.0	6.2	10.4	6.0
\$150K or more	5.9	2.2	3.8	2.6
<i>Employment status</i>				
Employed	48.1	46.6	54.0	47.9
Self-employed	8.6	8.7	12.2	12.9
Unemployed	9.1	11.9	10.1	12.5
Inactive	17.8	20.3	16.6	20.2
Retired	16.4	12.5	7.1	6.5
Total respondents	28146	17008	2296	806
<i>Drop in income</i>				
Yes	39.7	52.8	61.2	66.4
No	60.3	47.2	38.8	33.6
Total respondents	27585	16705	2270	795
<i>Homeowner with mortgage</i>				
Yes	68.5	74.1	100	91.9
No	31.5	25.9	..	8.1
Total respondents	17199	9099	2296	409
<i>Mortgage type</i>				
ARM	10.2	11.4	16.0	21.3
FRM	89.8	84.1	79.3	76.3
Total respondents	11322	6741	2296	376
0				

3 Variable definition, Model and Methodology

Our main goal is to attest to what extend financial literacy and financial behaviour drive over-indebtedness. To do so, we consider three measures of over-indebtedness: experiencing financial distress, being in arrears and being involved in a foreclosure procedure. We therefore analyse for each over-indebtedness concept the impact of financial literacy and of financial behaviour, controlling for a set of socio-economic characteristics.

Financial literacy measure

In the line of Hung et al. (2009) we understand financial literacy as the level of financial knowledge. We use the set of five financial literacy questions comprised in the survey to evaluate the financial knowledge of individuals and to construct a proxy for 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 following¹⁵:

¹⁵ Correct answers noted by an asterisk.

- (1) **Interest rate question:** 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) **Inflation question:** 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 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) **Bond price question:** 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) **Mortgage question:** 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) **Risk question:** 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 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 ('inflation question'). 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 (Table 2). When considering all the questions (Table 3) only 17 per cent of respondents were able to answer all the questions correctly. On average respondents correctly answered 3 questions.

Table 2- Financial literacy: responses to questions

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

Table 3 - Financial literacy: number of correct, incorrect and don't know answers

	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

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

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

Based on this financial literacy quiz we construct a financial literacy index – “**FL INDEX**” – which is defined as the percentage of questions correctly answered¹⁶. The FL INDEX can take distinct values of 0, 0.2, 0.4, 0.6, 0.8 and 1 (Table 4). 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 FL INDEX varies quite substantially across socioeconomic characteristics of respondents (Table 5). Financial literacy is lower among women, non-white and younger people. 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. Unemployed and inactive¹⁷ 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 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.

¹⁶ The “don’t know” and “prefer not to say” were categorized as wrong answers.

¹⁷ Full-time student, homemaker, permanently sick, disabled or unable to work.

Table 4 – 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	

Table 5 – FL INDEX and FB INDEX

		FL INDEX		FB INDEX	
		Mean	Standard deviation	Mean	Standard deviation
<i>Gender</i>	Female	0.562	0.283	0.605	0.173
	Male	0.696	0.267	0.619	0.172
<i>Age</i>	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
<i>Race</i>	Non-White	0.552	0.289	0.572	0.181
	White	0.648	0.277	0.622	0.168
<i>Region</i>	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
<i>Marital Status</i>	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
<i>Education</i>	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
<i>Household income</i>	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

<i>Employment status</i>					
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	
<i>Dependent children</i>					
No dependent children	0.63	0.280	0.616	0.166	
With children	0.609	0.285	0.592	0.180	
<i>Drop in income</i>					
Yes	0.606	0.281	0.578	0.178	
No	0.646	0.279	0.631	0.166	
<i>Homeowner with mortgage</i>					
Yes	0.696	0.254	0.645	0.166	
No	0.660	0.280	0.646	0.152	
<i>Mortgage type</i>					
ARM	0.707	0.255	0.621	0.169	
FRM	0.707	0.245	0.650	0.165	

Financial behaviour measure

In order to measure financial behaviour we 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. A similar approach has also been used by Atkinson and Messy (2012). The wording of the question and answer choices is the following¹⁸:

- (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.*
- (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.*

¹⁸ 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.

(6) Please indicate if (...) in the past 5 years (...) you have taken out a short term "payday" loan¹⁹?
(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 6. 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). 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 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%). 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.

Table 6– Financial behaviour: responses to questions

	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)	-	-	-	-
Weighted percentages of total number of respondents (N= 28,146)									
(a) Total of respondents with no checking account									
(b) Total of respondents with no credit cards									

¹⁹ "Payday" loans are small-dollar, short-term, unsecured loans that borrowers promise to repay out of their next paycheck or regular income payment.

Based on the questions above we 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 (Table 7).

Table 7 – 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	

As detailed in Table 6 mentioned above, women, non-white and younger people show a poorer financial behaviour. 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. 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.

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, we 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.*

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. 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 (Table 8).

Table 8 – Over-indebtedness: responses to questions

	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
Weighted percentages of total number of respondents (N=28146 for financial distress and foreclosure and N=11780 for arrears)			
(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.			

Using the responses to question (1), we 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, we 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, we use the responses to question (3) and create a variable called “**FORECLOSURE**” which is equal to one for all respondents 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 9.

Table 9 – 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

The over-indebted respondents have a similar socioeconomic profile (Table 2 mentioned above): 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 10). 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).

Table 10 – 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.

Table 11 –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
UNEMPLOYED	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

Model

To evaluate the impact of financial literacy and financial behaviour on over-indebtedness we specify the following probit model for each over-indebtedness measure:

$$P(Y_i = 1 | X_i, DI_i, FL_i, FB_i) = F(X_i' \beta + \rho DI_i + \gamma FL_i + \delta FB_i) \quad (1)$$

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 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. The explanatory variables considered (described in Table 11) 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, widowed 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); and 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). We also include as explanatory variables the type of mortgage (adjustable rate or fixed rate mortgage) and the experience of a large drop in income. $F(\cdot)$ is the cumulative distribution function of the standard normal distribution.

Considering that financial behaviour might be influenced by the financial literacy level of individuals (the correlation between FB and FL INDEX is 0.2, in order to avoid multicollinearity we use the residuals of equation (2) – called FB INDEX RES - in the model (1), instead of FB INDEX.

$$FB_i = c + FL_i + \varepsilon \quad (2)$$

Consistent with the literature review, we 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, we 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 we expect both to decrease the probability of over-indebtedness.

4 Results

The results of the probit estimation for each of the over-indebtedness measures are presented in Table 12, where the marginal effects for the probit regressions are reported²⁰. The Wald chi2 test results and the Pseudo R² are also shown. The probit regressions were re-estimated with robust standard errors given the likely existence of *heteroskedasticity* (LR test).

²⁰ Probit estimations were computed in STATA.

Table 12 – 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*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)	-0.02*** (0.01)	-0.02** (0.01)	-0.02** (0.01)	0.00 (0.00)	0.00 (0.00)	0.01** (0.00)	0.01** (0.00)
AGE (35-54) ⁽²⁾	0.06*** (0.01)	0.05*** (0.01)	0.05*** (0.01)	0.04** (0.02)	0.02** (0.01)	0.01 (0.01)	0.02* (0.01)	0.01 (0.01)	-0.01** (0.00)	-0.01*** (0.00)	-0.01** (0.00)	-0.01** (0.00)
AGE (55 or more) ⁽²⁾	0.06*** (0.02)	0.04*** (0.02)	0.05*** (0.02)	0.06*** (0.02)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01** (0.00)	-0.01 (0.00)
WHITE ⁽³⁾	-0.02* (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.02)	-0.08*** (0.01)	-0.07*** (0.01)	-0.07*** (0.04)	-0.07*** (0.01)	-0.02*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
SOUTH ⁽⁴⁾	-0.02** (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.03** (0.01)	0.02*** (0.01)	0.03*** (0.01)	0.02*** (0.01)	0.01 (0.01)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
CHILDREN ⁽⁵⁾	0.14*** (0.01)	0.13*** (0.01)	0.13*** (0.01)	0.12*** (0.02)	0.09*** (0.01)	0.08*** (0.01)	0.08*** (0.01)	0.06*** (0.01)	0.02*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
D/S/W ⁽⁶⁾	0.00 (0.02)	0.00 (0.02)	0.00 (0.02)	0.00 (0.03)	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.01* (0.00)	-0.01* (0.00)	-0.01 (0.0)	0.00 (0.00)
MARRIED ⁽⁶⁾	0.01 (0.02)	0.00 (0.02)	0.00 (0.02)	0.00 (0.02)	-0.02 (0.01)	-0.02* (0.01)	-0.02* (0.01)	-0.01 (0.01)	-0.02*** (0.00)	-0.01*** (0.01)	-0.01*** (0.01)	-0.01* (0.00)
COLLEGE ⁽⁷⁾	-0.06*** (0.01)	-0.05*** (0.01)	-0.04*** (0.02)	-0.02 (0.02)	-0.06*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.03*** (0.01)	-0.01*** (0.00)	-0.01*** (0.01)	0.00* (0.01)	-0.00 (0.00)
INC2 ⁽⁸⁾	-0.21*** (0.03)	-0.22*** (0.03)	-0.21*** (0.03)	-0.18*** (0.04)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)	-0.01 (0.02)	-0.01** (0.00)	-0.01* (0.00)	-0.01* (0.00)	-0.01* (0.0)
INC3 ⁽⁸⁾	-0.40*** (0.02)	-0.38*** (0.02)	-0.37*** (0.02)	-0.30*** (0.03)	-0.12*** (0.01)	-0.10*** (0.01)	-0.09*** (0.01)	-0.02 (0.02)	-0.02*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01** (0.00)
INC4 ⁽⁸⁾	-0.58*** (0.02)	-0.56*** (0.02)	-0.54*** (0.02)	-0.44*** (0.03)	-0.18*** (0.01)	-0.15*** (0.01)	-0.14*** (0.01)	-0.05*** (0.02)	-0.03*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01** (0.00)
SELF-EMPLOYED ⁽⁹⁾	0.06*** (0.02)	-0.01 (0.02)	-0.01 (0.02)	0.00 (0.02)	0.06*** (0.01)	0.03** (0.01)	0.03** (0.01)	0.03*** (0.01)	0.02*** (0.01)	0.21*** (0.08)	0.01*** (0.01)	0.01 (0.00)
UNEMPLOYED ⁽⁹⁾	0.14*** (0.02)	-0.01 (0.03)	-0.01 (0.03)	-0.02 (0.03)	0.07*** (0.02)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.02*** (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)
RETIRED ⁽⁹⁾	-0.11*** (0.02)	-0.11*** (0.02)	-0.11*** (0.02)	-0.01*** (0.02)	-0.09*** (0.01)	-0.09*** (0.01)	-0.09*** (0.01)	-0.06*** (0.01)	-0.01 (0.00)	-0.01 (0.00)	-0.01 (0.00)	0.00 (0.00)
INACTIVE ⁽⁹⁾	-0.01 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.04** (0.02)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02* (0.01)	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
ARM ⁽¹⁰⁾	0.10*** (0.02)	0.10*** (0.02)	0.10*** (0.02)	0.10*** (0.02)	0.13*** (0.04)	0.12*** (0.01)	0.12*** (0.01)	0.08*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.02*** (0.01)
DROP IN INCOME ⁽¹¹⁾		0.30*** (0.01)	0.30*** (0.01)	0.30*** (0.03)		0.14*** (0.01)	0.14*** (0.01)	0.11*** (0.01)		0.03*** (0.00)	0.03*** (0.00)	0.02*** (0.00)
FL INDEX			-0.11*** (0.02)	-0.19*** (0.03)			-0.09*** (0.02)	-0.11*** (0.02)			-0.02*** (0.01)	-0.02*** (0.00)
FB INDEX RES				-0.95*** (0.04)				-0.39*** (0.02)				-0.04*** (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	214.98
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.

Socioeconomic characteristics and type of mortgage

The results presented in columns (1) of Table 12 show, as expected, that men are less likely than women to become over-indebted although the results are not statistically significant for foreclosure. 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 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). We 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. 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, we 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.

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 12. 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.

Financial literacy

Financial literacy matters significantly for the prevention of over-indebtedness as shown by the results reported in columns (3) of Table 12. Controlling for socioeconomic factors, type of mortgage and the event of a negative income shock already discussed, we 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 socio-economic variables²¹ and introduces only very minor changes in the parameters values, which is an indicator of the robustness of the model.

Financial behaviour

Finally, in columns (4) we assess the impact of financial behaviour that is not explained by financial literacy on the incidence of over-indebtedness. Controlling for socioeconomic factors, type of mortgage, the event of

²¹ Noting that male are now 1 per cent more likely than female to get involved in a foreclosure process.

a negative income shock and financial literacy, we find, as expected, that having a positive financial behaviour highly reduces the probability of over-indebtedness. The results show that higher financial behaviour levels 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. But in contrast, the addition of the FB INDEX changes the significance of some socio-economic variables. It eliminates, for example, the significance of having a college education to explain financial distress 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 are consistent with the existence of a positive correlation between education or income and financial behaviour where less educated or less wealthy individuals reveal a poorer financial behaviour.

5 Conclusion

Using the data from the National Financial Capability Study carried out in the United States in 2009, we analyse the impact of financial literacy and financial behaviour on the likelihood of over-indebtedness. Considering socioeconomic factors, our results show that younger people are less likely of experiencing financial distress. Gender reveals to be a relevant variable for the intensity of over-indebtedness. In fact, men have lower probability of experiencing financial distress or being in arrears but exhibit higher probability of getting involved in a foreclosure process. Results also 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.

Results clearly show that financial literacy and financial behaviour have an important impact on over-indebtedness. Financial literacy contributes to the prevention of over-indebtedness since individuals with higher levels of financial literacy are less likely of becoming over-indebted. Likewise, individuals who engage in positive financial behaviours, such as spending less than their own income, setting a 'rainy day' fund, using credit wisely or looking for financial advice, are less likely to experience severe financial difficulties. Independently of the level of financial literacy and of financial behaviour, experiencing a large drop in income is an important determinant of over-indebtedness.

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 efficiently manage financial resources.

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