

# The impact of Financial Literacy on over-indebted Portuguese Families\*

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## Abstract

Over-indebtedness, which is commonly defined as the incapability of repaying debts on a structural basis, has increasingly become an issue for the Portuguese population during the years following the crisis of 2009. In 2010, one out of four households, felt at risk of over-indebtedness and, in 2015, personal insolvency represented more than two thirds of the overall number of insolvencies. Although Portugal has implemented significant reforms in order to comply with austerity measures, the accumulation of debts keeps being a fundamental need for individuals in order to smooth consumption over the cycle of life. Therefore, in order to face the rapid spread of financial products and services, there is a growing need of enabling consumers to build a more sophisticated financial knowledge. This work was carried out in collaboration with the Portuguese consumer association DECO that provides support and knowledge for over-indebted families. The main goal of the study is to examine the relationship between the level of financial literacy and the probability of being over-indebted, and the level of over-indebtedness of families that seek DECO's assistance. We designed a survey to measure the financial and economic literacy of the households. This paper is the first one to our knowledge finding that financial literacy has a significant impact on the probability of being-over-indebted. We also find that it might be relevant to implement diversified types of training based on the level of education.

**Keywords:** Over-indebtedness, Portugal, Financial Literacy, DECO

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# Contents

<b>1</b>	<b>Introduction</b>	<b>3</b>
1.1	Defining Over-indebtedness . . . . .	4
<b>2</b>	<b>Literature Review</b>	<b>5</b>
<b>3</b>	<b>DECO - Gabinete de Apoio ao Sobre-endividado</b>	<b>7</b>
<b>4</b>	<b>Survey Design and Data</b>	<b>8</b>
4.1	Survey Design . . . . .	9
4.2	Survey Implementation and Sample Composition . . . . .	10
4.3	Measuring Financial Literacy . . . . .	10
4.4	Measuring Over-indebtedness . . . . .	11
4.5	Measuring Time Inconsistency . . . . .	12
4.6	Descriptive Statistics . . . . .	13
<b>5</b>	<b>Methodology</b>	<b>15</b>
5.1	Financial Literacy and Over-indebtedness . . . . .	15
5.2	Financial literacy and the Severity of Over-indebtedness . . . . .	17
5.3	The Drivers of Over-indebtedness for different Education Levels . . . . .	19
<b>6</b>	<b>Drivers of Financial Literacy</b>	<b>21</b>
<b>7</b>	<b>Conclusions</b>	<b>23</b>

# List of Tables

1	Time inconsistency across OI sample . . . . .	12
2	Descriptive Statistics Over Indebted and non Over Indebted Sample	14
3	Marginal effects of probability of being OI for logit model . . . . .	16
4	Financial literacy and the severity of over-indebtedness . . . . .	18
5	The drivers of over-indebtedness for different education levels . . . . .	20
6	OLS - Financial Literacy drivers . . . . .	22

# 1 Introduction

According to Eurostat, the level of over-indebtedness in Portugal had increased significantly starting from the years of the crisis. Portugal exhibited an increase in the percentage of the population with arrears from 6.4% in 2008 to 12% in 2014. Although Portugal remains below the EU average, the Portuguese level of over-indebtedness has gradually moved closer to the European average, which showed a similar increase in the population with arrears from 9.9% to 12.7%, respectively from 2008 to 2014<sup>1</sup>. Likewise, the Ministry of Justice of Portugal denounced an increasing number of over-indebted cases, with 2.310 cases of personal insolvency in the third quarter of 2015, compared to only 116 cases in the third quarter of 2007. Interestingly, personal insolvency grew from 20.8% of the overall number of insolvencies in 2007 to 70.8% in 2015, a more than three-fold increase in insolvency cases [DGPJ, 2015]. Indeed, while in 2007 the percentage of households having great difficulties making ends meet was 15.6%, in 2014 it increased to 23.3%, way above the European average that in that same year reached 11.3%<sup>2</sup>. In line with the above-mentioned facts, subjective indicators also tend to suggest the Portuguese distress of being unable to repay debts. In 2010, 25% of the Portuguese population felt at risk of over-indebtedness [DG-EMPL, 2010]. Finally, according to EU-SILC<sup>3</sup>, the most commonly observed type of household that has the tendency to incur in financial mismanagement is typically headed by an individual aged 40 to 64, and with mortgages. It also observes that single parents, divorced/separated persons and households below the risk of poverty threshold are more commonly affected by over-indebtedness [CPEC, 2013].

The current standards of life imply a continuous interaction with financial terms and products on a daily basis. Ordinary consumers are often faced with rather complicated financial decisions, be it for debt management, asset building, savings and retirement planning or for simple borrowing purposes. Households resort to the credit markets in order to smooth consumption over the cycle of life, since the income of an average individual is expected to smoothly increase along her career, households are thus more inclined to deal with debts during their early working life, and repay them later.

Financial skills are therefore a major requirement in every day's choices. However, the spread of more complex financial products in the market (including student loans, mortgages, credit cards and pension accounts) has not been followed by a homogeneous spread of financial knowledge among the investors. Although the

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<sup>1</sup>Eurostat, 'Percentage of total population with arrears' (code: *ilc\_mdcs05*)

<sup>2</sup>Eurostat, 'Inability to make ends meet' (code: *ilc\_mdcs09*)

<sup>3</sup>The EU statistics on income and living conditions, abbreviated as EU-SILC, is the reference source for comparative statistics on income distribution and social inclusion in the European Union.

developments of financial products are advantageous [Rajan and Zingales, 1996], they challenge people’s ability to make prudent financial decisions. Many financial products and services have indeed proven to be complex for the average educated investors [Brown et al., 2015]. Thus, governments should see financial understanding as an investment in human capital.

## 1.1 Defining Over-indebtedness

The European Commission carried out a study to reach a common definition of over indebtedness across the EU:

*“An over-indebted household is, accordingly, defined as one whose existing and foreseeable resources are insufficient to meet its financial commitments without lowering its living standards, which has both social and policy implications if this means reducing them below what is regarded as the minimum acceptable in the country concerned.”*

[DG-EMPL, 2010]

The literature has identified the following main reasons for over indebtedness: adverse financial shocks; persistent low income; poor money management; over-commitment and over-spending [DG-EMPL, 2010].

Portugal has exhibited a changing trend in the type of households affected by over-indebtedness. Research shows that households with higher income and higher educational level, namely the Portuguese middle class, were the ones bearing the costs of the crisis and the increasing unemployment, followed by cuts in income and social benefits [CPEC, 2013]. Among the main drivers for over-indebtedness, Portugal’s experience can be summarized in the following main points: macro-economic factors; cost of living; types of credit/loan taken out by households; personal circumstances. Portugal has undergone significant changes in its macro-economic outlook. Unemployment reached the peak of 16.2% in 2013, private consumption fell and the economy was in a recession, with negative growth rates between 2009 and 2012 [INE, 2016]. The austerity measures implemented in the context of the Financial Assistance Programme, have put Portuguese households under financial pressure and access to credit for both households and firms decreased. Between 2008 and 2015 the access to credit for firms decreased by more than 50% and for households by 40%<sup>4</sup>. Banks have adopted more rigorous criteria for granting loans. Nowadays, they require more collateral, prefer short maturities, the loan-to-value ratio was lowered and the spreads increased [IMF, 2011]. Moreover, an interesting feature of the increasing accumulation of debts is the growing

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<sup>4</sup>Bank of Portugal, Publicações estatísticas, ‘Emprestimos concedidos pelo setor Financeiro’

number of households seeking advice on the negotiation of water and electricity debts<sup>5</sup>.

In Portugal, the main governmental institution in charge of over-indebtedness is the Directorate-General for Consumer Affairs, which is part of the ministry of Economics and Innovation. As the Directorate-General does not have an official definition for over-indebtedness, we rely on the definition given by the academic institute *Observatório do Endividamento dos Consumidores* that officially advises the government on over-indebtedness related issues: “over-indebtedness is a situation where there is a lack of income or other liquid assets that makes people incapable of paying their debts on a structural basis”. Crucial is the effort of DECO on the matter, specifically of the *Gabinete de Apoio ao Sobre-endividado (GAS)*, which was created in 2000 and that has the main role of assisting and providing consultancy to over-indebted families. The association aims to help all households that are over-indebted as a consequence of an involuntary action such as: unemployment, wage cuts or income decrease, illness or accidents, change in the household structure. In summary, that is, all households that acted without the intention of harming the creditors’ position. However, it does not provide assistance to households that consciously mismanaged their wealth [DECO, 2016a].

## 2 Literature Review

Over-indebtedness is a social issue. Hence, it is interesting to study and understand the main reasons why households live in a condition of disadvantage. Over-indebtedness is directly perceived as an issue at an individual level, but it eventually undermines the stability of the financial system as a whole [d’Alessio and Iezzi, 2013]. As pointed out by the European Commission: “*Qualitative research shows that financial mismanagement actually plays a much larger role than people seem prepared to admit to and often compounds other causes such as loss of income or low income to which people do attribute their financial difficulties.*” [DG-EMPL, 2010].

Nonetheless, as Lusardi and Tufano [2009] highlight, there has only been little research on how financial literacy relates to over-indebtedness. In the past decade there has been an increasing attention to the level of financial literacy of households. Bernheim and Kotlikoff [2001] were amongst the first researchers to denounce the low level of financial literacy of US consumers. Recent evidence suggests also a large share of the European population having a low level of financial literacy [Lusardi and Mitchell, 2013]. As the European Union states, financial literacy is a combination of: *awareness, knowledge, skill, attitude and behaviour*

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<sup>5</sup>Bank of Portugal (2012), ‘Bank Lending Survey’

*necessary to make sound financial decisions and achieve financial wellbeing* [EPRS, 2015]. Given that many consumers tend to not receive any kind of assistance or guidance when purchasing financial products or services, it is increasingly common to encounter consumers that opt for the first product they are presented with. A recent study estimates that 52% of the consumers act like this [DG-COMM, 2012]. Recent evidence suggests that a less financial literate household incurs more easily into committing financial mistakes. Hilgert et al. [2003] find that less financial literate and experienced households tend to be less willing to follow financial practices. Bernheim and Kotlikoff [2001] show that improving financial literacy can have a large impact on common decisions related to retirement savings, studying, or mortgage's contracts. Additionally, a higher level of literacy incentivizes the individuals to take part of the financial markets by investing in companies' stocks [Banks and Oldfield, 2007]. Although the causality between financial literacy and participation in financial activity is not easy to prove, it is demonstrated that both inadequate knowledge of financial planning in retirement and limited participation in the stock market are correlated with scarce financial knowledge [Van Rooij et al., 2011].

Moreover, financial illiteracy has shown to be positively associated with non-payment of consumer credit and excessive debt burden. Gathergood [2012] used lack of self-control, measured as time-inconsistency, together with financial illiteracy, to explain UK consumers' over-indebtedness, and finds that the former has more explanatory power than the latter. In order to test this, the sample used includes over 3.000 households that have debts. Both financial literacy and time inconsistency are measured through an online survey. Financial literacy is measured through three survey questions derived from the financial literacy literature, namely Lusardi and Tufano [2009]. Time inconsistency is measured through a question, where respondents self report their level of self-control with regard to financial choices. Over-indebtedness is finally measured through a self-reported measure of over-indebtedness level, as well as on the base of two delinquency indicators, which identifies consumers with either one month or three months delinquency on at least one credit item. Although to our knowledge there are not other studies directly relating over-indebtedness to financial literacy, Lusardi and Tufano [2009] find financial literacy to have a key role in retirement planning. Similarly, financial literacy is assessed through an online survey, implemented as part of the Rand American Life Panel, which includes basic financial literacy questions, as well as more sophisticated questions. As a further robustness assessment, the authors split the sample by age and by employment status in order to focus on younger respondents, finding that financial literacy remains a strong predictor for retirement planning.

As mentioned above, the lack of financial education may often lead individuals

to act irrationally. Indeed, financially illiterate households tend to save less: they tend to do fewer retirement planning, to use expensive debts like credit cards and they end up having greater overall dependence on debt as a means of financing their needs, which eventually may reflect into a reduced capacity of facing economic downturns. Lastly, as a result, improved financial literacy and stronger consumer confidence could incentivize a more stable behaviour, preventing households from overreacting in times of crisis [OECD, 2009].

### **3 DECO - Gabinete de Apoio ao Sobre-endividado**

DECO is a non-governmental organization which was established with the intent of promoting, developing and helping the protection of consumers' rights. The association promotes projects, organizes conferences and training sessions, always bearing in mind the specific interests of the associates and of the communities they belong to [DECO, 2016b]. In 2000, DECO introduced offices for debt counseling. Here, the families are invited to attend regular meetings in order to receive support and take advantage of the help of some experts, usually lawyers that try to renegotiate a payment plan with the creditors. DECO provides expertise in the following areas:

- Financial advisory: in order to improve financial decisions and to help renegotiating loan contracts.
- Financial literacy: in order to develop financial competencies and knowledge.
- Social support: in order to help needy families overcoming basic day-to-day difficulties.

The association aims to help a large number of families (up to 4.000 per year). In 2015, the GAS section - Gabinete de Apoio ao Sobre-endividado - of DECO received almost 30.000 requests of assistance from Portuguese families and opened more than 2.700 procedures. This continues the trend registered in 2014, suggesting that over-indebtedness persists despite the modest economic recovery experienced by the Portuguese economy. According to a recent publication of DECO, unemployment, as well as the worsened working conditions are the primary causes for financial difficulty of the families. The average number of loan contracts per household increased over 2015. Additionally, the percentage of credit defaults continued its upward trend, reaching 66% of the overall number of assistance requests in 2015, up from 63% in 2014. DECO registered an average debt burden among the assisted over-indebted families of about 77%, while the maximum percentage recommended by Portuguese banks and financial institutions is 40% [DECO, 2016c].

The individuals who resort to DECO for financial assistance, do not represent the entire population of over-indebted people in Portugal, and this happens for several reasons. Given the private nature of the association, there is not such a procedure that automatically qualifies all needy families as part of the selection process. Among all the applicants, only who clearly mismanaged its wealth is not assisted by DECO. Moreover, although DECO's debt counseling service is the sole initiative in Portugal, it is worth noting that the families seeking the help of the association are mainly households with primary or secondary educational level and that are aware of the existence and the role of the association. Households with higher educational levels tend to resort to other types of private assistance. As DECO's scope of action is limited in terms of geographical coverage, these families tend to live in the country's largest urban centers [Frade, 2005].

The Gabinete de Apoio ao Sobre-endividado affirms that the only group of households that tend to be excluded from their competency limits are people from the high-middle class. They do not seek their help as they already dispose of alternative arrangements to overcome their financial difficulties. According to DECO, the over indebted sample of families they help tends to be reasonably representative of the overall picture of the Portuguese over-indebted families. As a further confirmation of this, we compare the socio-economic characterization of our sample with the sample used by Gathergood [2012], which is a representative sample of 3.041 UK households with consumer credits debts. We report a similar division of the sample into females and males, as well as a similar percentage of married households, which broadly corresponds to half of the sample. Also, the average age is in both sample around 50 years old. Although, the percentage of unemployed people appears to be more severe in our sample, the percentage of employed and retired people is on average very close to Gathergood's sample.

## 4 Survey Design and Data

We relied on a partnership with DECO in order to distribute our survey between 13.03.2016 and 15.05.2016. We measure the following aspects of financial literacy: (i) basic financial literacy understanding, which implies some basic understanding of economic mechanisms; (ii) numerical ability; and (iii) more sophisticated financial literacy, which implies a deeper understanding of the functioning of the financial market. Besides measuring financial skills, we collected data on financial experience of the households (i.e. type of financial transactions they have already been exposed to), data on time inconsistency preferences<sup>6</sup>, as well as data on personal judgement on their financial knowledge and on their economic confidence.

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<sup>6</sup>Individual decisions being made at different points in time can be inconsistent with each other depending on expected utility anomalies.

Finally, Deco provided us with a detailed database on households' demographic characteristics, over-indebtedness severity, including type of credits and debt burden, and on type of expenses with related monthly amounts.

## 4.1 Survey Design

The survey is based on three main sections that aim at obtaining a comprehensive measure of financial literacy. It includes a set of 26 questions and on average it takes 15 to 20 minutes to be completed<sup>7</sup>. The first section follows Lusardi and Mitchell [2007] and it measures basic financial literacy, assessing knowledge such as compound interest, inflation, and time discounting (see Annex, A1). The second section reproduces five questions from the survey in Banks and Oldfield [2007] and it measures numerical ability by evaluating the capacity of the respondent to solve basic mathematical questions (see Annex, A2). The third section is partly based on a module designed by Van Rooij et al. [2011] and partly on questions specifically designed for the purpose of this questionnaire. It involves a deeper understanding of financial and economics mechanisms and it covers topics such as stock market, bond prices and interest rates (see Annex, A3).

In addition to measuring the overall financial literacy, the survey aimed at understanding behavioural characteristics of the respondents, as well as individual perceptions. Respondents were asked to self assess their level of financial knowledge. This question is relevant because individuals often take financial decisions relying on the perceived level of financial knowledge rather than on the actual level [Lusardi and Mitchell, 2007]. Likewise, this survey included a question on what is the respondents' confidence in the Portuguese economy in the next 12 months. Another characteristic that may influence economic behaviour and can be highly correlated with the actual and perceived level of knowledge is the financial experience that each individual has been exposed to. Given the cautious economic considerations that some financial transactions require, it may happen that people with a low level of financial literacy engage in unfavorable financial contracts. Similarly, financial experience can affect the level of financial knowledge [Lusardi and Tufano, 2009]. In order to assess this, respondents were asked to identify the type of financial transactions they had incurred in, such as types of borrowing and investments decision<sup>8</sup>.

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<sup>7</sup>Average estimated time on the base of online surveys

<sup>8</sup>For complete questionnaire, see Annex, A6

## 4.2 Survey Implementation and Sample Composition

The survey was implemented in two different groups of over-indebted people (OI). The first are the newcomers who reached DECO for financial assistance between 13.03.2016 and 15.05.2016. The survey was an integral part of all the data (demographic, socio-economic, and financial) that is routinely collected on OI families as part of the meetings that are scheduled with the OI families. Each representative of the household, registered in the DECO database, was requested to fill in the survey upon his/her arrival. This way, we ensured that each person would have no access to either calculators or internet. Moreover, DECO also spread the survey via email to all the over-indebted people on their database that started the financial assistance procedure between 2012 and 2015. This introduces a possible bias, since we cannot ensure that the respondents did not use the internet or other sources to improve the accuracy of their responses. While the numeracy and basic financial literacy sections involve some calculations, the sophisticated one includes straightforward questions that may be easily verified through the access to online resources. We use the information on the completion time to control for this possible bias, with an indicator variable for all online respondents that reached a larger than average financial literacy score in the sophisticated section, and that at the same time have recorded a total time to fill in the survey higher than the average.

Additionally, the survey was distributed to a group of non over-indebted people (NOI) that will be our control group. These are consumers that seek help from DECO, specifically from the consumer protection department. However, they do not seek help from GAS, therefore we believe it is reasonable to assume that they are not over-indebted. Although the control group is not representative of the overall Portuguese society, it is a good benchmark for the purpose of our study because it represents a sample of people that did not incur in financial problems. Our data also includes a number of observables of all the families (OI and NOI), including: education level, employment status, familiar status, age and gender.

## 4.3 Measuring Financial Literacy

We use our financial literacy questionnaire to build three different financial literacy indices (FLI). The first measure - aggregate FLI - incorporates all the questions that were presented in the three sections above, with the weight of each section increasing in its difficulty level. Similarly, within each section, each question had a specific score, once again based on complexity. For this score methodology ‘do not know’ and ‘incorrect’ answers count zero<sup>9</sup>. For robustness purposes, we also

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<sup>9</sup>The total score of the survey is 100. Basic FLI has a weight of 15 points and includes 5 questions with an individual weight that ranges from 2 to 4; Numeracy FLI has a weight of 20 points and includes 5 questions with an individual weight that ranges from 3 to 5; Sophisticated

report the results with the simple index obtained with equal weights. When using a FLI that attributes equal weighting to each questions, we obtain very similar results. The difference of the two FLI indicators for each observation have a final difference that ranges between -10% and +10% while the overall final score differs only by 4%. We therefore conclude that our measure of FLI is robust. The second measure - simple FLI - follows a simpler approach. The score is based on one most representative question for each of the three sections. The three questions selected were those that were more often answered correctly within each section. The third measure - Van Rooij FLI - follows the approach in Van Rooij et al. [2011], which construct a FLI based on the first set of questions of the current survey (corresponding to the first set of questions in our survey), and on more sophisticated financial knowledge (corresponding to the third set of questions of the current survey). In their indices the ‘do not know’ and ‘incorrect’ answers have different weighting. Therefore, each question is associated to a factor loading that accounts negatively for ‘do not know’ answers and zero for ‘incorrect’ answers. This is explained by the fact that generally ‘do not know’ are highly correlated with each other, being consistent among specific areas of knowledge [Van Rooij et al., 2011]. This finding is also in line with past research that emphasizes how most of the respondents cannot understand basic financial concepts, particularly those relating to bonds, stocks, mutual funds, and the working of compound interest [Bernheim and Kotlikoff, 2001]. The factor loadings used in this paper are used to build our third FLI.

#### 4.4 Measuring Over-indebtedness

For the purpose of this research, level of over-indebtedness is measured as the percentage amount of money out of the monthly income that each household commits to pay on a monthly basis to repay the debts. From now on it will be called debt burden. This measure is included in the data provided by DECO and is computed from the detailed data on the household’s income and expenditures which is collected by DECO. As the level of over-indebtedness is not available for the NOI sample, the alternative measure used, when comparing the OI and NOI groups, is a binary variable equal to 1 for the OI sample and zero for the NOI sample.

Given the different nature of the sub-samples in our data, we implement the following empirical specifications. Firstly, we run a logit regression that estimates the probability of being OI, using all observation from both OI (paper and online) and NOI households. This allows us to understand the relationship between financial literacy and the probability of being OI. Secondly, we run a linear regression

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FLI has a weight of 65 points and includes 12 questions with an individual weight that ranges from 4 to 6.

on the actual debt burden of the OI households (paper and online), with the aim of testing the impact of financial literacy on the severity of OI.

## 4.5 Measuring Time Inconsistency

Over-indebtedness may result of a behavioral bias that leads individuals to incur in more debt than they rationally could afford, since they may be subject to temptations and over-value present benefits, i.e., be hyperbolic discounters or apply time-inconsistent discount rates. Laibson [2008] explains this with the theory of hyperbolic discounting, where decision makers apply time-inconsistent discount rates. This survey included two questions with the objective of measuring time inconsistency: ‘Suppose someone was going to pay you 100 euros 1 month from now. He/she offers to pay you a lower amount today. What amount today would make you just as happy as receiving 100 euros in 1 month?’ We then ask the same question with the time scale extended to one year.

According to Shui and Ausubel [2004] people tend to prefer the smaller-sooner reward in the first question and the larger-later reward in the second question. Time inconsistency can be captured by the two questions mentioned above through the calculation of the two discount rates that the respondent applies in each of the answers. Households with exponential utility are expected to have the same discount rate for the one month period and the one year period, while households with hyperbolic utility will have a different discount rate [Laibson, 2008]. However, we chose not to use the measure of time inconsistency in our empirical specifications, since the answers suggest that either people did not fully understand the meaning of the questions or that among the respondents there is a quite large share of people that do not understand the time value of money.

Table 1: Time inconsistency across OI sample

	Amount (euros)		Discount rate (%)	
	Month	Year	Month	Year
Overall sample	78,61	77,28	27,21	2,17
Subsample 1 (see point i above)	79	91,56	26,58	0,74
Subsample 2 (see point ii above)	80,21	80,21	24,68	1,86

We observe the following (please refer to Table 1 for details):

- 27,4% of the respondents shows a preferred amount today over the month period lower than the preferred amount today over the year period (subsample 1 in Table 1). On average this group of respondents is indifferent between receiving 79 euros today and 100 euros in a month. This implies a discount rate of almost 27%.
- 46,6% of the respondents indicates an equal preferred amount today for the month and year time period (subsample 2 in Table 1). On average this group of respondents is indifferent between receiving 80 euros today and 100 in a month and year time. This still implies a very high discount rate for the month time (24,7%) but a very low discount rate for the year time (0,74%).

## 4.6 Descriptive Statistics

Table 2 summarizes the characteristics of the three subsamples used in this specification. It is apparent that online and paper OI behave differently in terms of FLI, as well as in terms of other socio-economic demographic characteristics. Besides, having higher FLI slightly higher than both NOI and OI on paper, the subsample is mostly characterized (70%) by employed households and almost 50% of the sample has at least achieved a secondary education degree.

OI households that filled in the survey on paper appear to be slightly less educated; the percentage of OI with a university degree is equal to 16% compared to the 24% of the NOI and 23% of the OI that filled in the survey online. While the percentage of employed people is much higher in the online OI (70%) compared with the other two, the percentage of unemployed people registers the largest percentage among the OI group (34%). The paper OI subsample consistently registered lower financial literacy in each of the three sections of the survey. While the sophisticated section appears to be the most difficult one also among the NOI, the section that shows the largest different between the paper OI and the NOI sample is the numeracy one. This may suggest a greater difficulty for over-indebted people to perform simple calculations. Noteworthy are the characteristics of the OI subsample that filled in the survey online: the high educational level of this group may be the result of a selection bias given the free choice of participating in the survey online (i.e. only people more confident on their financial knowledge may have decided to participate). Worth mentioning is that over 80 surveys online were started but not concluded, as a confirmation of the fact that a large number of respondents invited to participate decided not to finalize their survey.

Lastly, as the financial literacy scores of the OI online might be biased by the presence of respondents that took advantage of other resources to answer the survey, it is hard to take any immediate conclusion regarding the average financial scores reported by the online OI subsample. However, the statistical significance

Table 2: Descriptive Statistics Over Indebted and non Over Indebted Sample

Comparison Over-indebted and non Over-indebtded Sample		(%)			Statistical significance	
		Paper OI	Online OI	NOI	Paper OI vs. NOI (p-value)	Online OI vs. NOI (p-value)
<b>Gender</b>	M	50	51	60		
<b>Education</b>	1. Ciclo	18	3	8		
	2./3. Ciclo	32	17	19		
	C. Tecnico	0	10	4		
	Secundario	30	48	34		
	Superior	16	23	24		
	Blanks	4	0	11		
<b>Employment Status</b>	Employed	43	70	49		
	Retired	15	14	22		
	Unemployed	34	15	13		
	Blanks	9	0	16		
<b>Marital Status</b>	Married	39	44	45		
	Unmarried/Divorced	61	56	55		
<b>Financial Literacy</b>	Aggregate	34	48	43	0,2127	0,3236
	FLI	(0,2137)	(0,1893)	(0,2403)		
	Basic	48	49	52	0,7043	0,5968
	FLI	(0,3283)	(0,2004)	(0,3407)		
	Numeracy	55	72	65	0,2127	0,2396
	FLI	(0,333)	(0,2536)	(0,3312)		
	Sophisticated	25	40	34	0,185	0,2477
	FLI	(0,2185)	(0,2376)	(0,2531)		
<b>Average age</b>		48,98	47,17	51,47		
<b>Observation number</b>		110	71	100		
<b>Time dummy</b>			22			

(Standard deviation reported in parenthesis)

column in Table 3 shows that the paper OI differs to a greater extent from the NOI sample than from the online OI online subsample. The time dummy variable in Table 2, is a dummy indicator that treats as 1 respondents with time of response over the average and 0 all the others. As showed above, there are 22 observation out of the 71 that are identified as being from respondents that have a time of response above average.

## 5 Methodology

As mentioned in Section 5.4, we analyse the probability of being over-indebtedness and the severity of over-indebtedness. The first specification uses the three subsamples (paper and online OI and NOI), while the second only uses the two OI subsamples.

### 5.1 Financial Literacy and Over-indebtedness

The outcome variable in this regression is the probability of being over-indebted (1=OI; 0=NOI) and it is regressed on our variable of interest, the financial literacy index. Although logit and probit models do not differ to a great extent in terms of final results, we opt for a logit model as it appears to be a better fit for our sample.

Table 3 shows the three regressions performed, using different forms of the FLI, as detailed in Section 5.3, and the additional regressions (iv), (v), and (vi) that split the aggregate FLI in its three sections. We control for education, employment status, and demographic characteristics. More specifically, we use the following indicator variables: university (1 if the respondent has a university degree, and 0 otherwise); unemployed (equal to 1 if the individual is unemployed and 0 otherwise); married (1=married; 0=single, widow(er) or divorced); female (female=1; male=0). We introduce age (in years) linearly in the regression. We also create an indicator variable for the subsample the individual belongs to, and we cluster errors on the base of these subsamples, dividing them in: NOI; OI online; OI on paper. Moreover, in order to account for the possible bias of the online OI subsample, we use an indicator variable for online respondents that recorded an above the average response time. This indicator is interacted it with the four different FLI<sup>10</sup>.

For consistency, from now on we will use the same FLI across all specifications, namely, the aggregate index (see Section 5.3). Besides enabling us to obtain more significant result, we believe that this FLI is the most appropriate as in its score it includes all the survey questions and it allows to comprehensively evaluate the respondents' financial literacy, as well as capturing different types of knowledge.

Table 3 suggest that obtaining one more correct answer, which correspond to an increase of the financial literacy score by 4.55% (average score of a question out of the whole survey) will decrease the probability of being over-indebted by -1.19%. While the basic financial literacy index seems to not have a major impact on the probability of OI, the numeracy one shows the largest impact: obtaining one more

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<sup>10</sup>Time dummy (0=respondents that recorded a time of response above the average; 1=all the others).

Table 3: Marginal effects of probability of being OI for logit model

VARIABLES	Probability of being OI					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
<b><i>Financial literacy</i></b>						
Simple	-0.093** (0.0405)					
Van Rooij		-0.003 (0.0139)				
Aggregate			-0.262* (0.159)			
Basic				-0.0154 (0.0192)		
Numeracy					-1.194*** (0.256)	
Sophisticated						-0.801*** (0.0888)
<b><i>Controls</i></b>						
University	-0.043 (0.2653)	-0.061** (0.0296)	-0.0256 (0.0312)	-0.0397 (0.0515)	-0.134 (0.166)	-0.205 (0.142)
Unemployed	0.152** (0.0776)	0.161** (0.0776)	0.156* (0.0908)	0.160 (0.0988)	0.815*** (0.0469)	0.777** (0.387)
Married	-0.005 (0.0096)	-0.013 (0.0121)	-0.00129 (0.00491)	-0.00726*** (0.00211)	0.0719*** (0.0262)	-0.0467* (0.0269)
Female	0.047 (0.0304)	0.049 (0.0349)	0.0374* (0.0202)	0.0379** (0.0176)	0.217*** (0.00241)	0.208** (0.0813)
Age	-0.005** (0.0023)	-0.005* (0.0024)	-0.00404** (0.00186)	-0.00449** (0.00128)	-0.0213*** (0.00728)	-0.0209** (0.00889)
Constant					2.240 (1.677)	1.846 (1.747)
Observations	236	236	236	236	236	236

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

correct answer in the numeracy section, which corresponds to an increase in the numeracy financial literacy score by 4% (average score of a question out of the numeracy section) will decrease the probability of being over-indebted by 4.78%.

Finally, obtaining one more correct answer in the sophisticated section, which corresponds to an increase of the sophisticated financial literacy score by 5.42% (average score of a question out of the sophisticated section) will decrease the probability of being over-indebted by 4.34%. Also, it is interesting to mention the impact of the control variables. Unemployment and being a female has a positive impact on the probability of OI, while being married or older have a negative impact. The coefficients of the covariates are consistent across specifications.

## 5.2 Financial literacy and the Severity of Over-indebtedness

We now restrict ourselves to the two OI subsamples (online and paper) - a total of 78 observations. The average debt burden is 62%<sup>11</sup>. Over-indebtedness severity is regressed on the financial literacy index and also on the same controls that were used in Section 6.2. The only difference is the education level. This is now not treated as a dummy because our linear model seems to gain some explanatory power when using education as a categorical variable. It ranges from 1 (up to 4<sup>th</sup> grade) to 5 (higher education). Category 2 includes individuals with between the 5<sup>th</sup> and the 9<sup>th</sup> grade, category 3 the individuals with vocational training, and 4 up to the 12<sup>th</sup> grade. Given the different sampling of the two subgroups, we cluster the standard errors at the subsample level. We also correct for the possible bias of the online subsample by including in the cluster variable the online respondents that are above the average response time<sup>12</sup>.

Finally, after checking for the existence of possible a correlation between the variable of interest, financial literacy index and the control variable, level of education, we conclude that collinearity is not a concern for our model. The average FLI per educational level shows similar result across each of the three categories defined in the education variable (1=48%; 2=51%; 3=51%; 4=52%; 5=52%). Table 4 confirms the relationship between financial literacy and OI obtained in Table 3, this time for the severity of the phenomenon. Obtaining one more correct answer, which on average corresponds to an increase of the FLI by 4.55%, will decrease the percentage of debt burden by 2.44%. Only the aggregate FLI is statistically significant.

Since the dependent variable includes severely over-indebted people, we decide to winsorize the data to avoid the results from being driven by outliers. After

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<sup>11</sup>For a detailed descriptive statistic of the current sample see Annex, A4

<sup>12</sup>We have performed some additional tests and we are aware that our model may suffer from heteroscedasticity. In order to deal with this issue, we use the clustering option that automatically ensures the use of robust standard errors and therefore corrects for heteroscedasticity.

Table 4: Financial literacy and the severity of over-indebtedness

VARIABLES	Level of over-indebtedness (%)			
	(i)	(ii)	(iii)	(iv)
<b><i>Financial Literacy</i></b>				
Aggregate	-0.537** (0.104)			
Basic		0.233 (0.357)		
Numeracy			-0.0640 (0.332)	
Sophisticated				-0.559 (0.323)
<b><i>Controls</i></b>				
Education Indicator	-0.0192 (0.0545)	-0.0536 (0.0910)	-0.0439 (0.0789)	-0.0123 (0.0441)
Unemployed	-0.0755 (0.0637)	-0.0895 (0.0463)	-0.0753 (0.0511)	-0.0857 (0.0624)
Married	0.157 (0.0808)	0.149 (0.0623)	0.156 (0.0813)	0.145 (0.0973)
Female	0.0706* (0.0173)	0.0261 (0.0317)	0.0186 (0.0186)	0.110 (0.0716)
Age	0.00340 (0.0101)	0.00262 (0.00848)	0.00328 (0.0102)	0.00319 (0.0100)
Constant	0.726* (0.202)	0.551* (0.183)	0.640 (0.373)	0.666* (0.188)
Observations	78	78	78	78
R-squared	0.049	0.037	0.032	0.061
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, *p<0.1				
Note: standard errors are clustered				

accounting for this, the relationship between financial literacy index and percentage of debt burden turns to be insignificant, suggesting that the presence of these outliers may be driving the result of our regression<sup>13</sup>. We believe that a drawback of the model is the rather small number of observation.

### 5.3 The Drivers of Over-indebtedness for different Education Levels

Given the different variability of the FLI across the different educational levels, we believe it is interesting to analyse our sample interacting our FLI variable with the level of education: higher education, secondary education, and primary education. In order to have a higher number of observation for each educational level we aggregate category 1 and 2 from Section 6.2 into primary education, and category 3 and 4 into secondary education. Among the three subsamples, secondary education is the one showing more variability. Regressions (i), (ii), (iii) in Table 5 show the results from the interaction of each educational level dummy, in order higher, secondary and primary with the FLI aggregate. Following this approach no one of the interacted variables appear to have a significant impact on the level of over-indebtedness.

Thus, we opt for a new approach and we divide our sample in educational subsamples: higher, secondary and primary education. The results reported in Table, namely regression (vi) and (v) show the results obtained when considering the higher education subsample. We find that in the higher education subsample the FLI has a significant impact on the level of over-indebtedness. We believe that these results differ from the ones obtained when considering the whole sample due to the possible bias of some observations from variables such as the level of over-indebtedness. Interestingly, the results suggest that the main component of FLI able to explain the level of over indebtedness for these subsample is the sophisticated one (see regression (v)). In order to understand whether this is due to the existence of a higher variability of knowledge among more educated people regarding more complex aspects of financial literacy, we plot the three financial literacy indices (basic, numeracy and sophisticated) and we conclude that the sophisticated financial literacy index do not show more variability. We may infer that a more sophisticated financial literacy knowledge may lead more educated people to decrease their debt burden. Specifically, one more correct answer in the sophisticated section, which corresponds to an increase of the sophisticated financial literacy score by 5.42% (average score of a question out of the sophisticated section), will decrease the probability of being over-indebted by 4.90%. Lastly, the other two groups characterized by a lower educational level (secondary and

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<sup>13</sup>See Annex, A5 for detailed coefficients.

Table 5: The drivers of over-indebtedness for different education levels

VARIABLES	Level of over-indebtedness (%)				
	(i)	(ii)	(iii)	(iv)	(v)
<b><i>Financial Literacy</i></b>					
Aggregate	-0.000 (0.1589)	-0.300 (0.1503)	-0.052 (0.1096)	<b>-0.672*</b> (0.0726)	
Basic					
Numeracy					
Sophisticated					<b>-0.904**</b> (0.0629)
<b><i>Controls</i></b>					
Metropolitan	-0.032** (0.0003)	-0.023 (0.0095)	-0.033** (0.0019)	-0.151 (0.139)	-0.130 (0.107)
Employment Status	-0.073 (0.0266)	-0.081 (0.0358)	-0.075 (0.0350)	0.0728 (0.104)	0.029 (0.0781)
Time dummy	0.026 (0.1426)	0.041 (0.1376)	0.032 (0.1650)	-0.120* (0.0143)	-0.083 (0.0186)
Gender	0.091 (0.0483)	0.105 (0.0426)	0.091 (0.0562)	0.114 (0.163)	0.185 (0.135)
Age	0.006 (0.0124)	0.006 (0.0127)	0.006 (0.0128)	0.005 (0.0129)	0.013 (0.010)
Constant	0.440 (0.5470)	0.483 (0.5367)	0.422 (0.6019)	0.749 (0.560)	0.408 (0.496)
Observations	78	78	78	20	20
R-squared	0.020	0.033	0.021	0.267	0.338

Robust standard errors in parentheses,

\*\*\* p<0.01, \*\* p<0.05, \*p<0.1

Note: standard errors are clustered

primary education) are not presented here, as they do not show any significant relationship between financial literacy indices and level of over-indebtedness.

## 6 Drivers of Financial Literacy

We now use the individual socio-economic and demographic characteristics to test their relationship with financial literacy. For the purpose of this analysis, the sample is first considered as a whole and it is afterwards divided between OI and NOI households in order to understand how financial literacy may have different drivers among the two groups. The different financial literacy indices are regressed on the same control variables used in the previous models. Education is treated as categorical variable and the Metropolitan variable is a dummy variable that identifies whether the city, where respondents are from, is a big one or not (1=Porto or Lisboa; 0=others). In order to account for the noise created by the online respondents that recorder a time of response above average, we include the time dummy, presented in Section 5.6, in the ‘All sample’ model as well as in the ‘OI sample’.

Table 6 shows that the estimates do not change across specifications or subsamples. Education is almost always positively significant. While in the ‘NOI subsample’ a higher level of education suggests a positive impact on the financial literacy indices, in the ‘OI subsample’ Education is significant only for the sophisticated financial literacy index. This suggests that for over-indebted households a higher level of education positively influences the sophisticated financial literacy index. Being unemployed has a consistently negative impact on numerical financial literacy. Moreover, being a female is only significant in the NOI subsample and it indicates that being a female has a negative impact on the financial literacy score. As expected, the time dummy variable shows a positive relationship with the financial literacy index. Results suggest that in the ‘OI sample’ the numeric financial literacy index increases to a great extent if the respondent is part of that group of households that according to our analysis may have used other resources in order to answer the survey.

Table 6: OLS - Financial Literacy drivers

Variables	All sample				OI sample				NOI sample			
	Aggregate	Basic	Numeric	Soph.	Aggregate	Basic	Numeric	Soph.	Aggregate	Basic	Num.	Soph.
Education	<b>0.0681**</b> (0.0108)	0.0690 (0.0245)	<b>0.0722*</b> (0.0204)	<b>0.0666***</b> (0.00538)	0.0651 (0.0121)	0.0543 (0.0343)	0.0641 (0.0247)	<b>0.0680**</b> (0.00316)	<b>0.0750***</b> (0.0187)	<b>0.0919***</b> (0.0282)	<b>0.0772***</b> (0.0271)	<b>0.0704***</b> (0.0198)
Unemployed	-0.0448 (0.0211)	0.00197 (0.0202)	<b>-0.0995**</b> (0.0140)	-0.0387 (0.0395)	-0.0597 (0.0317)	0.000776 (0.0204)	<b>-0.0930**</b> (0.00315)	-0.0633 (0.0525)	-0.0121 (0.0503)	-0.0164 (0.0664)	<b>-0.139*</b> (0.0828)	0.0279 (0.0550)
Metropolitan	-0.00498 (0.00670)	-0.0478 (0.0238)	-0.000952 (0.0242)	0.00364 (0.0120)	-0.00784 (0.0113)	-0.0655 (0.0335)	-0.0178 (0.0468)	0.00853 (0.0240)	0.00643 (0.0519)	-0.0649 (0.0664)	0.000465 (0.0702)	0.0247 (0.0586)
Married	0.0633 (0.0300)	0.0827 (0.0294)	<b>0.118**</b> (0.0191)	0.0421 (0.0420)	<b>0.0808**</b> (0.00424)	0.0557* (0.00849)	0.126 (0.0327)	0.0726 (0.0146)	-0.0230 (0.0540)	0.0655 (0.0715)	0.0717 (0.0746)	-0.0726 (0.0618)
Age	<b>0.00139**</b> (0.000139)	0.000915 (0.000953)	-0.000316 (0.000469)	<b>0.00203*</b> (0.000551)	<b>0.00140**</b> (0.00004)	0.00205 (0.000345)	-0.000179 (0.00100)	0.00174 (0.000290)	0.00200 (0.00193)	-0.000273 (0.000288)	-0.00118 (0.00271)	0.00350 (0.00212)
Female	-0.0460 (0.0800)	-0.0914 (0.0748)	-0.0381 (0.0251)	-0.0380 (0.103)	0.00133 (0.103)	-0.0151 (0.0653)	-0.00861 (0.00650)	0.00819 (0.141)	<b>-0.170***</b> (0.0531)	<b>-0.226***</b> (0.0754)	-0.0756 (0.0848)	<b>-0.186***</b> (0.0597)
Time dummy	<b>0.117**</b> (0.0224)	0.0232 (0.0339)	<b>0.172**</b> (0.0391)	<b>0.121*</b> (0.0358)	0.121 (0.0278)	0.0541 (0.0458)	<b>0.206*</b> (0.0282)	0.110 (0.0468)				
Constant	0.109 (0.0391)	0.0229* (0.0587)	0.384* (0.0977)	-0.00388 (0.0195)	0.0858 (0.0232)	0.177 (0.0345)	0.356 (0.0943)	-0.0183** (0.00123)	-0.170*** (0.0531)	0.313* (0.182)	0.512** (0.199)	-0.279 (0.159)
Observations	213	213	213	213	140	140	140	140	73	73	73	73
R-squared	0.267	0.144	0.214	0.204	0.307	0.104	0.235	0.250	0.280	0.265	0.206	0.237

Robust/clustered standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Standard errors are either clustered or robust depending on the type of sample (i.e. NOI sample only has one cluster therefore the method used for SE is robust).

## 7 Conclusions

This study is the first to assess that financial literacy has a significant impact on the probability of being over-indebted. It is important to highlight that this does not imply causality, since there is a potential for reverse causality: the people who are more careful financial managers, because they find it important to behave as such, are also the ones who invest more in financial education and thus, score better on the FLI. We also show that the relationship between financial literacy and over-indebtedness is mediated by education level. Households with higher education seem to be affected to a greater extent by the score of the sophisticated financial literacy, or by more sophisticated types of financial knowledge. This may suggest the need of instituting diversified types of financial oriented trainings depending on the level of education.

Financial knowledge is a main concern for DECO especially among the families that are receiving its assistance. Empowering every household with the right set of skills is the first step needed in order to enable these families to make the right choices. Hence, it is important to use this survey as a way to fill in the gap of research existent on the relationship between financial literacy and over-indebtedness. Given the small number of observations in our sample, this analysis is best seen as an exploratory one that paves the way for future research in this field. Firstly, it is important that DECO continues the data collection effort as a means to expand the sample. Secondly, DECO runs a financial literacy education module with underprivileged families which is a natural candidate to test causality in this setup. One may envisage an appropriate experimental design setup combined with the administration of our questionnaire before and after the training, together with appropriate follow-up of the individuals in order to test for behavioural responses. We would then be in a position to test whether or not the training increases financial literacy and whether those changes translate into actual financial behaviour.

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