Think Twice or Be Wise in Consumer Credit Choices*

Christian D. Dick Lena M. Jaroszek**

December 18, 2014

*We are grateful to Tabea Bucher-Koenen, Arvid Hoffmann, Zwetelina Iliewa, Annamaria Lusardi, Lukas Menkhoff, Arno Riedl, Stefan Ruenzi, Max Schmeiser, Claus Schmitt, Paul Smeets, Meir Statman and participants of the FMA Annual Meeting 2014, the Boulder Summer Conference on Consumer Financial Decision Making 2014, the FMA European Meeting 2014, the University of Mannheim research seminar, FDIC's Consumer Research Symposium 2013, the Behavioural Finance Working Group Conference 2013, IFABS 2013 and SMYE 2013 for valuable comments. This paper has been partly derived from an analysis made in the context of a project report by ZEW on behalf of the German Federal Ministry of Food, Agriculture and Consumer Protection. Earlier versions of this paper formerly circulated under the title: "Knowing What Not To Do: Financial Literacy and Consumer Credit Choices".

**Centre for European Economic Research (ZEW) Mannheim and University of Mannheim, Germany, Email: jaroszek@zew.de

Think Twice or Be Wise in Consumer Credit Choices

Abstract

We analyze whether the frequent use of credit lines is influenced by households' thinking dispositions, i.e. their tendency to reflect upon decisions or to opt for intuitive and impulsive solutions. We consider the special case of Germany where credit lines on current accounts are available to 80% of the population. We document that the frequent usage of costly credit lines is more likely for people who give intuitive but incorrect answers in the Cognitive Reflection Test. Our analysis of a rich sample of household data also adds to the discussion on the role of financial literacy in credit decisions. Our results provide evidence that consumers with higher levels of financial literacy buy less on credit lines independently from their tendency to reflect.

JEL-Classification: D12, D14

Keywords: Household finance, cognitive reflection, thinking dispositions, financial literacy

1 Introduction

Credit lines are an expensive but very flexible credit product to bridge short term liquidity gaps. However, when consuming on a credit line, households probably do not reflect on the consequences of their consumption decisions. Concerns are that credit lines are misused to cover regular overspending and that households neglect in their consumption decision that they will have to offset this month's credit against a reduction in the budget of the following month. Therefore, if impulsive or unsophisticated individuals are unable to fully conceive the consequences of their debt decision, concerns arise that they will incur significant costs on these credits, especially if they roll over their outstanding balances from month to month.

Germany provides ideal conditions for testing whether it matters if consumers tend to reflect on their decision, since a specific form of short-term credit, namely credit lines on checking accounts, does not necessarily involve deliberate decision making, but can also be taken out impulsively. This stands in contrast to, e.g., mortgages or installment credits which require a lot of effortful thinking until the paperwork is accomplished. Credit lines basically are a negative balance on a checking account. Credit lines on checking accounts are the substitute for credit cards in Germany and they are comparable to U.S. credit card accounts in several ways[1]: They are broadly available among all population strata. About 80% of German households are eligible to use a credit line on their current account. Half of those with access to credit lines use them at least occasionally. Credit lines are a convenient but also costly credit product to smooth consumption in the face of temporary liquidity gaps. The interest rates charged at about 10 to 20% p.a. are considered to be expensive.[2] Credit lines are used without any professional consultation and their size usually amounts to a multiple of the consumer's net monthly income (but seldom more than 10,000 EUR). They differ from credit cards in that interest on the outstanding balance is due immediately (no delay period) and in that an outstanding balance is charged against the monthly paycheck. An interesting difference is that

[1]Credit lines can be considered a substitute for credit cards, since less than 3 percent of all payment cards in Germany are true credit cards according to the Statistics on Payments and Securities Trading, Clearing and Settlement in Germany 2008 to 2013 by the Deutsche Bundesbank. An analysis of credit card usage would not yield results representative for a broader population. Note that of the different overdraft programs common in the US (credit lines, linked accounts, automated overdrafts) only overdraft lines of credit are common in Germany. They differ from U.S. overdraft programs in that for most part no transaction related fees are raised. We will focus exclusively on these credits and refer to them as overdraft (lines of) credit, overdraft lines or credit lines interchangeably.

[2]This judgment is the prevailing view in the political debate in which e.g. the German Federal Ministry of Consumer Protection (BMELV) has appealed to credit institutions to decrease interest charges on credit limits.

credit line use is independent of the method of payment. Therefore, the specific institutional setup in Germany allows us to unambiguously measure credit decisions rather than a mixture of credit decisions and transaction method choices. This is an advantage compared to the literature on the use of credit cards (e.g. Klee, 2008; Koulayev, Rysman, Schuh, and Stavins, 2012).

To illustrate the societal relevance of credit line usage, we perform some back of the envelope calculations: Statistics from the Deutsche Bundesbank document that consumers are on average overdrawn on their account by 450 EUR at month-end. Taking into account that only 40% of all households actually use their credit lines at least once a year, this means that those consumers who are overdrawn have outstanding balances of on average 1125 EUR. Considering that the median net income in Germany amounts to roughly 1300 EUR it becomes clear that the concern of rolling over outstanding balances on a monthly basis is justified. Since rents are typically paid at the beginning of each month, households will begin the new month already overdrawn which may cause a cycle of debt.

Our analysis focuses on the question whether consumers' general tendency to reflect upon responses will matter in the credit decision context. This question has no room in normative theories which assume that households make rational choices and decide according to optimization problems such as the life-cycle theory (Modigliani and Brumberg, 1954) which postulates that households borrow in expectation of an increasing income and smooth their consumption over time according to their time-consistent preferences. Descriptive theories try to alleviate the lacking predictive power of normative models for individuals' real-world behavior by modelling the observable systematic deviations. An important strand of such descriptive models giving room to consumers' tendency to reflect, views intertemporal choice as the outcome of a conflict between multiple selves with dual preferences: an impulsive myopic self and a farsighted planning self.[3] The distinction of impulsive fast decisions as opposed to controlled decisions also complies with dual processing frameworks in the sense of Stanovich and West (2000) who describe human thinking processes. They distinguish impulsive, intuitive processes (System 1 thinking) from deliberative, rational ones (System 2 thinking).[4] In our analysis of individuals' credit decisions we measure an individual's tendency to rely on consciously controlled processes rather than automatic first intuitions by their *cognitive reflectiveness* and we

[3]There are models assuming that the two agents act alternately (e.g. Schelling, 1984; Winston, 1980) while others capture an internal conflict between a myopic "doer" and a far sighted "planner" (Shefrin and Thaler, 1988).

[4]Dual processing theory is backed by neuroeconomic evidence that short-term impulsive behavior is associated with the activity of different areas of the brain than long-term planned behavior (McClure, Laibson, Loewenstein, and Cohen, 2004).

hypothesize that individual borrowing behavior is influenced by cognitive reflectiveness. We expect that people who reflect more will rely on credit lines less frequently.

Even in case households reflect upon their credit decisions, how much to consume or to save remains a difficult consideration. Households might simply fail to determine the correct costs of credit due to a lack of *financial literacy*, as put forth by e.g. Lusardi and Mitchell (2011). Recently, research on financial literacy has extended its focus from investment decisions[5] to credit-related issues, such as credit conditions and in particular high cost credit (Disney and Gathergood, 2013; Lusardi and Mitchell, 2013), credit card usage and over-indebtedness (Lusardi and Tufano, 2009), the delinquency on (general) debt (Disney and Gathergood, 2011) and subprime mortgages (Gerardi, Goette, and Meier, 2010). In line with this evidence we expect that households with low financial literacy will use credit lines more frequently.

The distinction between cognitive reflection and financial literacy as drivers of credit decisions requires different responses from economic policymakers: behavioral arguments typically call for tighter regulations of financial activities (e.g. limiting fees, the accessibility to loans or the maximum amount to be taken out or requiring consumers' active opt in)[6], which is expected to protect consumers from making adverse decisions. In contrast, evidence in favor of financial literacy as the driver of financial decisions is often taken as a proof that financial education is improving financial decisions (van Rooij, Lusardi, and Alessie, 2011; Guiso and Jappelli, 2009; Bucher-Koenen and Lusardi, 2011). Hence, arguments from our analysis may serve as the foundation for political choices between extending regulation or financial education. However, if financial literacy only improved decisions of reflective individuals, the impact of financial education programs may be severely limited.

Our empirical analysis of a survey of more than 2,000 households representative for the German population[7] provides evidence that impulsive individuals are about 6 percentage points more likely to frequently use short-term credit compared to their more reflective counterparts. Set against a baseline probability of 17 percent, this increase is economically significant. Besides this first result, limited

[5]Concerning investment decisions a lack of financial literacy is associated with inadequate saving decisions (Lusardi and Mitchell, 2007; Bucher-Koenen and Lusardi, 2011; van Rooij, Lusardi, and Alessie, 2012), with lower stock market participation (van Rooij, Lusardi, and Alessie, 2011) and with lower portfolio diversification (Guiso and Jappelli, 2009).

[6]In 2009 the Federal Reserve Board amended Regulation E requiring financial institutions to obtain their customers' active consents before charging overdraft fees on ATM and point-of-sale transactions and Regulation DD forcing financial institutions to regularly disclose total overdraft fees.

[7]The SAVE survey comprises rich information about financial decisions as well as socio-economic characteristics of more than 2,000 German households. The survey was conducted by the Munich Institute of the Economics of Aging (MEA).

understanding of financial products and the inability to perform financial computations can be driving forces of credit-decisions. Against the background that impulsive (non-reflective) consumers are likely to frequently rely on credit lines, we ask whether knowing better would help them - or whether deciding impulsively dominates better knowledge. Our analyses provide evidence that financial literacy has a mitigating effect on frequent credit line use independently from the individual's tendency to reflect and the two effects are of equal size. According to our evidence, the understanding of financial products and markets leads impulsive individuals to rely on short-term credit as seldom as their less knowledgable but more reflective peers, i.e. the probability that an impulsive individual frequently uses a credit line is decreased by 23 percent (about 4 percentage points) if she is financially literate.

Our study is related to a recent paper by Stango and Zinman (2014) who explore the role of limited consumer attention for checking account overdrafts. They found that an attention shock caused by consumers' participation impacted on their credit behavior. While their results suggest that attention shocks have a stronger effect on consumers with less education and lower financial literacy our results focus on the general tendency to reflect instead of attention shocks and do not speak in favor of an interaction effect with financial literacy.

2 Data

We empirically analyze whether short-term credit decisions are driven by an individual's cognitive reflection. Comparing usage profiles of impulsive consumers to those of reflective individuals allows us to draw conclusions whether their credit demand is rational. Furthermore, we investigate whether knowing better, i.e. being financially literate, can enhance credit decisions given the personal level of cognitive reflection. To do so, we analyze a unique dataset which comprises rich information about financial decisions as well as socio-economic characteristics of German households - the SAVE study conducted regularly until 2010 by the Munich Institute of the Economics of Aging (MEA). The survey is representative for the German population and covers information on demographic and economic characteristics, focusing on savings and old-age provisions. The data is particularly well suited to link individual traits to detailed information about the household balance sheet and socio-demographic characteristics, and has already been used for research on financial literacy by, e.g., Bucher-Koenen

and Lusardi (2011), Bucher-Koenen and Ziegelmeyer (forthcoming) and Glaser and Klos (2012).[8] For the purposes of our analysis, we have to content ourselves with cross-sectional data from the survey year 2009 because this questionnaire is the only one including a special module comprising a measure which differentiates between impulsive personalities and those who reflect on their decisions. Contrary to earlier studies, we do not rely on imputed values in the SAVE data, neither for descriptive statistics nor for regression results, but instead reconstruct missing values. We decided to apply this approach because missing values mainly stem from our explanatory variables for which it is uncommon to use imputed values.[9]

Concerning consumer credit, we focus on a question from the survey eliciting the usage frequency of overdraft lines of credit on checking accounts ("Dispositionskredite"). As documented by the household survey, about 80 percent of all households in Germany are eligible to use a credit line on their current account. In 2009, 2,176 out of 2,222 respondents (98 percent) indicate whether their checking accounts possess an overdraft line of credit. Of the 1,733 respondents with an available credit line, 97 percent indicate the frequency of consumer credit use. The participants can choose among the four predefined answers "never", "1 to 3 times a year", "4 to 6 times a year", "more often or constantly". Hence, the variable of interest regarding the usage of overdraft is of categorial nature and censored on both sides (naturally censored by zero on the lower bound and by questionnaire design on the upper bound). The distribution of answers on usage frequency is displayed in Table 1. The largest share of 46.8 percent of respondents indicate to never use overdraft credit, but there is also a considerable fraction of 17 percent who answer that they use overdraft credit more than six times a year or constantly (we refer to this group as the frequent usage group). According to evidence by Hayashi and Cuddy (2014) consumers using overdraft programs monitor their account balance more frequently than consumers who never use overdrafts. This evidence speaks in favor of the assumption that especially the group of frequent users are well aware when their financial sources are insufficient and that they do not run into credit out of ignorance only.

[Insert Table 1 here.]

[8]For a detailed description of the design and the results of the survey please refer to Börsch-Supan, Coppola, Essig, Eymann, and Schunk (2009).

[9]Control variables are only very seldom missing if the explanatory variables are provided. In Section 4 we include a robustness test, verifying that our results are not driven by a non-response bias. We provide descriptives for the different data filters in Appendix C.

Since we ask whether individuals rationally decide to use their credit lines, we analyze their rational-thinking skills by means of the Cognitive Reflection Test (CRT) suggested by Fredrick (2005). The CRT is comprised of three tasks provided in Appendix A.[10] The tasks are constructed in a way that triggers an intuitive response which comes to mind effortlessly but is incorrect. An individual with higher disposition to reflect is likely to question the intuitive response and eventually to detect the mistake. Because of this reasoning, Toplak, West, and Stanovich (2012) interpret the CRT as a direct measure of rational thought in line with a high correlation between the CRT and a rational-thinking measure. They underline this notion by pointing to the fact that cognitive ability is no guarantee that people will engage in deliberate thinking, which is mirrored in the CRT test results of highly select students at MIT, Princeton, and Harvard who also provided the impulsive answers in Fredrick (2005). One advantage of the CRT as a measure of reflectiveness stems from the fact that it is a performance measure and therefore not prone to potential self-reporting biases. Although the CRT has been found to be a potent predictor of performance on a wide sample of tasks from the heuristics-and-biases literature (e.g., Toplak, West, and Stanovich, 2012; Fredrick, 2005; Cokely and Kelley, 2011; Campitelli, 2010; Oechssler, 2009), the CRT has thus far not been associated with real life financial outcomes. We hypothesize that respondents will behave analogically in everyday financial decision making.

The distribution of responses to the questions are reported in Table 2, Panel A. The CRT is successful in that the majority of respondents provide either the impulsive or the correct response (around three quarters in the three questions, or less than 10 percent of incorrect but non-impulsive answers). The questions of the CRT are not difficult in the sense that it is easy to verify that the answer that comes to mind impulsively is incorrect and the correct solution is understood when explained to subjects. While two out of the three exercises were answered correctly by about 40 percent of respondents in each case, the prominent "bat-and-ball" problem triggered the impulsive wrong answer in two thirds of responses. Nearly one half of the survey participants answer all three questions incorrectly (see Table 2, Panel B). The proportion of respondents answering all questions correctly

[10]The first task, the "bat-and-ball puzzle", has been introduced in Kahneman and Frederick (2002) and is also featured in Kahneman (2011), pp. 44-49.

amounts to only 13.9 percent. On average 1.26 questions are answered correctly.[11]

[Insert Table 2 here.]

We deduct our proxy for financial literacy from a comprehensive module of questions included in the 2009 SAVE survey. These multiple choice questions are a subset of the questions by van Rooij, Lusardi, and Alessie (2011) and provided in Appendix B.[12] The questions aim at evaluating the ability to solve basic mathematical problems occurring in financial markets (interest rate compounding, real vs. nominal quantities), and to comprehend the intuition behind specific financial products. In this way, our measure of financial literacy aggregates information from mathematical and institutional questions. A subset of four questions captures basic financial concepts such as percentage calculus numerical skills as in Lusardi and Mitchell (2008) and Bucher-Koenen and Lusardi (2011). These skills are certainly necessary in the context of financial decisions, which often involve compounding interest and inflation considerations. Since the questions do not require deep knowledge specific to financial markets, we will refer to them as basic financial literacy or numeracy as also suggested by Lusardi (2012). Five advanced questions assess more innate financial concepts regarding knowledge of financial assets' characteristics, the stock market, risk-return relationship and diversification. While in the context of investment decisions financial literacy is often considered to be an endogenous variable, we perceive it unlikely that people can learn about the principles of stock, bond and fund investments from their experience with short-term consumer credit products. We therefore argue the direction of causality to go uniquely from financial literacy to credit usage.

The empirical distribution of responses is reported in Table 3 and the distribution of basic and advanced financial literacy across sub-groups for education, age, and gender is reported in Appendix D, Panels B and C. Table 3 Panel A shows that some basic and advanced financial concepts are conceived better or worse than others. Very broadly speaking, each question is answered correctly by about 50 to 80 percent of respondents. Especially the concepts of interest compounding, when

[11]The distribution of reflectiveness across groups formed according to education, age, and gender is reported in Appendix D, Panel A. The distribution of results compares closest to that of the web-based studies reported in Fredrick (2005). This is plausible, given that the resemblance between our sample and the online participants is probably higher compared to students from Harvard, MIT, Princeton, but also less selective U.S. universities who formed the other test groups.

[12]In the survey years 2007 and 2008 a set of three questions was included. Besides the broader scope of the questions, in 2009 the respondents could for the first time actively indicate that they cannot or do not want to answer. This option reduces the probability that individuals try to guess the correct answer and therefore allows for a clearer definition of the proxy for financial literacy. For an extensive literature review on papers measuring financial literacy, please refer to Fernandes, Lynch, and Netemeyer (2014).

a realistic interest rate for a savings account is assumed (basic question 1), and return volatility of different assets (advanced question 1) are well understood. However, one more difficult advanced question about the relation between interest rate and fixed coupon bonds is answered correctly by only 9.4 percent of respondents. With respect to the advanced questions, respondents indicated much more frequently that they cannot or do not want to answer a question instead of answering incorrectly than for the basic questions. Panel B reports the fractions of respondents who were able to answer a specified number of questions correctly. If the number of correct answers is zero, respondents answered either incorrectly, indicated that they do not know the correct answer or completely refused to answer questions. About 40 percent of respondents answer at least 4 questions correctly. The mean of correct answers is 5. Close to 60 percent of participants indicate at least once that they do not know the correct answer, which is evidence for the importance of providing this answer option.

[Insert Table 3 here.]

The analysis takes into account several demographic characteristics of the respondent and the household as a whole which potentially play a role in the context of overdraft credit usage. According to normative theory household net wealth[13], monthly net income, respondent age, as well as family and employment status influence consumers' debt demand. Since life-cycle theory suggests a non-linear relation between credit demand and age we also include squared age (scaled by 100 in order to enhance readability of coefficient estimates). We furthermore include education as a rough proxy for general cognitive skills and occupation in order to address the argument that occupational groups may be assessed differently in banks' credit worthiness tests. More specifically, respondents indicate whether they are blue- or white-collar workers, civil servants, self-employed, retired or others (e.g. student). The family status is captured by a dummy variable indicating whether the household consists of a single person or is shared with a partner and we also take into account the number of children in the household. Education is measured by respondents' schooling: as at least a lower secondary education ("Hauptschulabschluss") is compulsory in Germany, we capture higher education by mid-level education ("Mittlere Reife" or equivalent) and A-level education ("(Fach-)Hochschulreife"). We furthermore include respondents' gender and the self-assessed extent of respondents' economics education at school or during an apprenticeship (measured by a seven point Likert scale), which are

[13]We include quartiles of net log wealth in order to reduce noise from imprecise estimates on asset and debt positions. For a more detailed description of assets included and descriptive statistics please refer to Appendix F

important control variables in the tests on the impact of financial literacy. We provide a descriptive overview of the usage frequency of overdraft lines of credit across demographic groups in Appendix E. Detailed descriptive statistics of demographic control variables are included in Bucher-Koenen and Lusardi (2011).

3 Empirical Analysis

Our empirical analysis proceeds in several steps. First, we introduce our econometric approach to analyze determinants of consumer credit usage (Section 3.1). Applying this approach, we evaluate our hypothesis that an individual's tendency to reflect or to decide impulsively will influence short-term credit decisions. We deduct whether credit usage behavior can be judged rational (Section 3.2). In a further step we ask whether knowing better, i.e. being financially literate, can enhance credit decisions given the personal level of cognitive reflection (Section 3.3).

3.1 Econometric approach

We take a systematic look at the determinants of the usage frequency of short-term consumer credit, $Creditfreq^{\star}$. First, we focus on the role of cognitive reflection, CRT, and include (depending on the specification) a battery of control variables Φ on the RHS of the equation, i.e.

$$Creditfreq_i^{\star} = \beta CRT_i + \gamma' \Phi_i + \epsilon_i \tag{1}$$

The vector of control variables Φ includes (log) income, wealth quartiles, age, squared age (scaled by 100), gender, family status, dummy variables for the occupational status (white-collar employees being the base group), for the educational status (a lower secondary degree being the base group), respondents' self-assessed extent of economic education, as well as a dummy variable capturing unemployment of the respondent and/or the respondent's spouse. As the data about the usage of consumer credit is of categorical nature (there are four subgroups), $Creditfreq^{\star}$ is not directly observable; hence, we consider Eq. (1) a latent variable model and run ordered probit regressions.

3.2 Reflectivity and consumer credit usage

We hypothesize that individuals without the tendency to reflect may irrationally decide to consume right away instead of waiting for the next paycheck, even though they are aware that overdraft credit is expensive. If this is the case, their credit decisions are driven by their thinking dispositions. We analyze this hypothesis by taking Eq. (1) to the SAVE data. The results of our baseline analysis are displayed in Table 4.

In the first row of Table 4 the *CRT score* shows the effect of higher reflectiveness according to Fredrick (2005). The measure counts the number of correct answers to the test.[14] Each time the respondent resisted the impulsive answer and engaged into reflecting on the solution, one point is added to the score. Higher values indicate reflective personalities with a tendency to decide rationally while low scores identify impulsive individuals. We expect the *CRT score* to be negatively related to overdraft usage frequency.

[Insert Table 4 here.]

The regression results in columns (ii) and (iii) confirm our hypothesis concerning reflectiveness and credit decisions: The *CRT score* enters the regression with a negative coefficient; i.e. individuals with a tendency to reflect and to decide rationally (with a high *CRT score*) are likely to use short-term credit facilities seldom. In contrast, impulsively deciding individuals (with a low *CRT score*) are likely to use overdraft credit frequently or even permanently. The relation between credit line usage frequency and *CRT score* is highly significant and robust to adding control variables.

In order to interpret the magnitude of coefficient estimates, the right hand panel of Table 4 presents average marginal effects for the four usage frequency groups. Individuals are more likely to never consume on credit lines when they decide upon reflection. Answering correctly to one more question of the CRT makes a person 3.5 percentage points more likely never to rely on overdraft credits. Comparing this figure to the unconditional probability of 46.8 percent proves the economic magnitude of the effect: reflecting on just one case more than average in the CRT makes an individual 7.5 percent less likely to rely on overdraft credit. On the other extreme we see a group of people relying more often than 6 times yearly or constantly on overdraft credit. Reflecting more on one CRT problem

[14] We require that all three CRT items are answered, otherwise the score will turn into a missing value.

decreases the probability to be in this high usage group by 2.2 percentage points. In relation to the baseline probability of 17.0 percent this equals a decrease of 12.9 percent. In unreported analyses we also calculate predicted probabilities[15] for the outcome variable when the *CRT score* varies to its extremes: An individual which answers all CRT questions after reflection is 10 percentage points (21 percent) more likely to never use credit lines compared to someone who answers all CRT questions impulsively. For the excessive usage groups results are similar - answering always impulsively increases the probability to be in this group by more than one third (6.3 percent) as opposed to a very reflective person.

We use the measure by Fredrick (2005) to assess thinking dispositions and count the correct answers to the Cognitive Reflection Test. However, Table 2 shows that there are also small fractions of participants answering the questions wrong but different from the intuitive response. These shares amount to 3%, 12%, and 6% of all answers respectively. While they are grouped together with the impulsive answers in the measure by Fredrick (2005), we also define a measure "CRT(-)" which counts the number of impulsive answers only (and assigns zero values to other incorrect or correct answers). This measure should therefore be positively correlated to credit line usage. The results from regressing overdraft usage frequency on this alternatively defined measure are included in the most right-hand column of Table 4. As expected, the coefficient estimate on the measure counting intuitive responses is positive, highly significant and nearly of the same magnitude in absolute terms as the original measure. Since all regression coefficients are quantitatively very close to the original measure, we decided to stick to the definition of Fredrick (2005).

Further demographic determinants. While the role of reflectiveness remains unaffected when adding demographic characteristics to the RHS, it is interesting to look at these control variables in detail: Comparing columns (i) and (iii) indicates that wealth and age are the most important control variables determining credit decisions, which is in line with the assumptions of life-cycle theory. Somewhat surprisingly, household income is not significant in explaining overdraft credit use frequency.

[15] E.g., $P[(Creditfreq_i = \text{"Never"})|CRT\ score_i, \Phi_i]$, i.e., the probability of not using short-term credit depending on cognitive reflection and other control variables. Likewise, we are also able to compute $P[(Creditfreq_i = \text{"More often than six times or constantly"})|CRT\ score_i, \Phi_i]$, i.e., the probability of using short-term credit frequently. Predicted probabilities are calculated based on the specification (ii) of the baseline analysis (Table 4), which does not require determining characteristics with respect to household structure, respondents' occupation or education. This simplification is reasonable since coefficient estimates on the s*CRT score*, log income and age vary modestly between the full specification (column iii) and the reduced specification.

Still, it enters with a negative sign, which seems reasonable. This finding may be connected to the evidence that household wealth is a very important predictor for short-term credit usage. Although the effect of increasing wealth is non-monotonic, not being in the lowest wealth group significantly reduces the probability to frequently rely on credit lines. Our results provide evidence that a lack of reflectiveness is particularly severe for low-wealth households, since being poor particularly increases the probability to be in the group of frequent users of short-term credit. According to predictions of life-cycle theory, we find a hump shaped pattern in age for the probability to rely on credit: individuals in the period of family or household formation (30-40 years) are most likely to use credit more frequently, whereas this behavior changes markedly for those aged 55 years and older. Furthermore, having children increases the frequency of overdraft credit usage. This argument is plausible in light of unexpected expenses in connection with children. Unexpected expenses are all the more a problem for single parents who cannot balance their budget with their partner internally. The coefficient on the variable indicating whether a person lives in a relationship is not significant, but enters with the hypothesized negative sign. We take the subjects' occupation into account for two different aspects: on the one hand, banks might prefer certain occupations when granting credit, especially installment credit. Overdraft credit can then work as a substitute for consumer credit. On the other hand, especially households with irregular income may be forced to bridge short-term liquidity shortages by using overdraft credit. However, we find no clear pattern for the relationship between occupational situation and credit line usage when controlling for age and wealth. AlikeLikewise, neither general education nor self-assessed economics education have a significant effect on credit decisions.

3.3 Does knowing better help? The role of financial literacy.

We found short-term credit decisions to be shaped by consumers' reflectiveness or lack thereof. However, CRT results are also related to general cognitive abilities (Fredrick, 2005). To address this issue, in our baseline analysis we control for general cognitive abilities by including the respondents' general education, which had no effect on the explanatory power of the *CRT score*. Another measure closely associated with financial decision making and also related to cognitive abilities is financial literacy (Bucher-Koenen and Lusardi, 2011). Financial literacy is defined as the knowledge and skills pertaining the successful management of personal financial affairs (Alba and Hutchinson, 1987). We therefore ask whether financial literacy will have a mitigating effect on the predictive power of the CRT and

analyze the interplay between financial literacy and reflectiveness. In our analysis in Table 5 we first include a crude variable for financial literacy indicating whether the respondent answered at least 7 out of 9 questions correctly (i.e. more than the median number in the sample, which is 6 correct answers) in order to facilitate interpretation. More sophisticated measures which can be deducted from the same set of questions included in the SAVE 2009 survey are presented in the robustness section 4.6. The results are qualitatively equivalent.

[Insert Table 5 here.]

The regression of overdraft credit usage frequency on financial literacy and control variables without the inclusion of reflectiveness (column ii) confirms a significant role of financial literacy for credit taking decisions. This finding speaks in favor of the hypothesis that subjects with higher levels of financial literacy better understand financial concepts such as compound interest, and that being aware of high costs of overdraft credit usage leads to a lower usage frequency. This evidence is in line with findings by Disney and Gathergood (2011, 2013), Lusardi and Tufano (2009), and Gerardi, Goette, and Meier (2010) who also confirm a relation between credit decisions and financial literacy. Since we include information on schooling in our control variables we conclude that neither general education nor self-assessed economics education can account for the effect of financial literacy. This result has earlier been advocated by van Rooij, Lusardi, and Alessie (2011) who claim that financial literacy covers concepts different from general knowledge and which is why general education can only imperfectly proxy for financial literacy.

Turning to the question whether a lack of reflectiveness can be mitigated by better knowledge, we simultaneously include both explanatory variables into our estimation model (column iii). We observe that both effects remain statistically significant and the coefficient estimates are only slightly decreased compared to the estimations when only considering one of the two factors (in columns i and ii). The stability of the coefficient estimate confirms that reflectiveness and financial literacy cover different aspects of personal traits and have explanatory power on their own. This finding undermines the role of financial education, since it is difficult to predict ex ante whether impulsive spending can be compensated by better knowledge.

In order to evaluate the economic effect of financial illiteracy we provide average marginal effects for the fully specified model from column (iii) in the right hand panel of Table 5. As before, marginal

effects are displayed for the four usage groups. Considering financial literacy slightly decreases the marginal effect of reflectiveness: If an average individual is more reflective (measured by one more correct answer to the CRT), it is 2.9 percentage points more likely that this person never uses credit lines (this equals a decrease of 6.2 percent compared to the unconditional probability). At the other extreme, impulsive persons (who answer one more question impulsively in the CRT) are 10.6 percent more likely to frequently use short-term credit (this equals an increase by 1.8 percentage points). What is more, the average marginal effect of being financially literate can compensate for a lack of reflectiveness. In-depth financial knowledge increases the likelihood never to rely on short-term credit lines by 5.8 percentage points (or 12.4 percent), while it decreases an individual's probability to frequently use credit lines by 3.7 percentage points (or 21.8 percent).

We find that the effect of financial literacy on credit line use is relatively independent from the level of cognitive reflection, i.e. implicit interaction effects between the two explanatory variables are low. Since interaction effects are difficult to correctly incorporate in the ordered probit estimation framework this results is documented in Table 6 by the predicted probabilities for an exemplary household to never or very frequently use credit lines. We provide predicted probabilities for an average income, average age households in the second wealth quartile and vary between low and high financial literacy for all four levels of cognitive reflection.

[Insert Table 6 here.]

The estimated probabilities illustrate the results from the regressions' marginal effects calculation: higher financial literacy and higher cognitive reflection are associated with less credit line use. Whether an individual is less or more financially literate has similar effects no matter what the person's tendency to reflect is. In unreported results (available on request), we repeat the analysis for poor and rich or young and old households. Although the baseline predicted probabilities vary significantly with age and wealth (as would be expected from the marginal effects analysis), the effects of cognitive reflection and financial literacy on credit line use remain stable and the interaction effect insignificant.

Our evidence speaks in favor of financial literacy having a mitigating effect on lacking reflectiveness. Oftentimes, evidence for financial literacy being a driver of financial decisions is taken as argument for increasing the scope of financial education (van Rooij, Lusardi, and Alessie, 2011; Guiso and Jappelli, 2009; Bucher-Koenen and Lusardi, 2011). From the analysis of predicted probabilities for exemplary

households we deduct that possible policy interventions need not to be targeted to a certain audience, because the mediating effect of financial literacy is independent from the tendency to reflect and from household socio-demographic controls. We also find financial literacy to be a qualification on its own which cannot be substituted by general education or general mathematical abilities (see Section 4.2. However, evidence collected by Fernandes, Lynch, and Netemeyer (2014) admonishes that the impact of hitherto existing financial education programs on financial behavior is only modest. Still, a recent study by Brown, Collins, Schmeiser, and Urban (2014) uses the introduction of state mandated financial education classes in public school curricula as natural experiment analyzing the impact on you adults credit behavior. They find that after the introduction of the financial education programs young adults have higher credit scores and lower delinquency rates compared to their peers in control states.

4 Robustness

Besides our main analyses we examine which aspect of financial literacy helps more in explaining short-term credit choices: knowledge about financial products and markets or financial numeracy. Furthermore, we ask whether for another form of unsecured credit, namely consumer installment credit, the same factors are relevant for individuals' credit decisions. As robustness exercises, we demonstrate that the results in the main part are not driven by our measure of reflectiveness, by the simplicity of the measure of financial literacy, by the choice of our econometric approach or by some households that are credit-constrained and have to rely on overdraft credit because they do not have access to consumer credit.

4.1 Is IQ an omitted variable in our analysis?

A severe concern for our analysis is that the effects of cognitive reflection and financial literacy are genuinely driven by cognitive abilities (or IQ). Unfortunately, we cannot directly rule out this concern since respondents' IQ is not elicited in the SAVE survey. However, Fredrick (2005) and Toplak, West, and Stanovich (2012) provide evidence that even when including different IQ measures into their analyses, cognitive reflections remains an informative predictor beyond IQ levels. They report correlations between the CRT and IQ tests between 0.17 (for the WASI vocabulary test) and 0.44 (for

SAT scores). We take two different approaches addressing the issue that cognitive reflection may be an omitted variable. First, we proxy for IQ levels by considering respondents' vocational training beyond their schooling (which is included in all the regressions in this paper). We assign ISCED97 education levels to each respondent. In the left-hand panel of Table 9 we include ISCED97 levels in a score taking the values 2 to 5 according to the ISCED97 definitions.[16] We also include dummy variables indicating the different ISCED97 levels. Secondly, we apply factor analysis to extract immanent factors underlying the set of items on cognitive reflection, financial literacy and schooling.

We use an iterated principal factor analysis to extract three indexes for the three underlying characteristics. The factor loadings from the iterative principal factor analysis are well in line with the characteristics we expected to find. The financial literacy factor loads strongest on binary items indicating whether each financial literacy question was answered correctly. It also loads on self-assessed financial literacy (for details see Section 4.7) but to a much lesser extent. The factor capturing cognitive reflection loads negatively on items indicating intuitive answers to the CRT and positively on those items indicating correct answers. It is the only factor which loads positively on an item that gauges whether respondents think of themselves as "spontaneous" opposed to "pensive" personalities - we use this as a measure of self-assessed thinking dispositions (for details please refer to Section 4.8. The loadings of the factor we assume to capture cognitive abilities have qualitatively similar factor loadings to cognitive reflection which is reasonable. However, the negative loading on self-assessed thinking dispositions and its higher loadings on general schooling lead us to conclude that the two factors capture two related but differing concepts.[17] The regression results from including these three factors (as proxies for IQ, FL and cognitive reflection) are included in the right-hand panel of Table 9.

[Insert Table 9 here.]

While ISCED97 education variables enter the regressions with the expected signs (higher education is related with lower probability for frequent credit line use), the coefficient estimates are all statistically insignificant. The coefficient on the CRT as well as on financial literacy decrease slightly in magnitude when including ISCED97 education. We interpret this as evidence that IQ is related

[16] In Germany education is mandatory until the age of 16. There are no participants in the SAVE survey with education levels below ISCED97 level 2 which indicates a lower-secondary education. We cannot identify from the survey whether people have ISCED97 education qualifying for level 6 ("secondary tertiary education").

[17] A table documenting the factor loadings is included in Appendix G

to both concepts. However, statistical significance for the coefficient on cognitive reflection is not reduced. The significance of financial literacy decreases to the 10% level. Taken together we conclude, that although IQ is probably related to the performance in the CRT as well as the financial literacy test, both concepts remain informative for credit decisions.

4.2 The role of numeracy

In order to deepen our understanding of the aspects of reflectiveness and financial literacy, we analyze the impact of mathematical skills which enter the CRT as well as the financial literacy test. Although both tests require only modest levels of mathematical aptitude, mathematical skills certainly play a role. Since the SAVE data does not provide a performance measure of mathematical abilities, we proxy for numeracy by relying on the subset of financial literacy questions that evaluate basic mathematical problems occurring in financial markets (the "basic" financial literacy questions).[18] Table 8 presents correlation of the different measures when defined as score counting the number of correct answers.

[Insert Table 8 here.]

As expected, the correlation analysis shows some positive correlation between the financial literacy measures and the CRT. This is plausible given that both measures are related to individuals' cognitive abilities. Interestingly, the correlation of numeracy (basic financial literacy) and advanced financial literacy is only as high as 0.56, which is further evidence for the moderate overlap between the two measures. The correlation between the self-assessed extent of financial education at school is only slightly positively correlated with the performance measures of financial literacy. The correlation is a little higher for advanced financial literacy compared to basic financial literacy. The fact that self-assessed financial literacy proxies are only mildly correlated with performance based measures underlines the importance of quiz questions for approximating financial literacy.

In the ordered probit regression analysis, we regress overdraft usage frequency groups and define the literacy measures as indicator variables, which take a value of 1 if the numbers of correct answers are above the sample median. The "Numeracy" indicator variable shows whether a person was able to correctly answer all 4 questions (notice that half of the participants were able to correctly calculate

[18] Lusardi (2012) gives a review of numeracy questions included in financial literacy surveys in different countries. The set included in the SAVE survey is representative for these questions.

at least three exercises, which proofs that the questions are very easy). "Advanced literacy" indicates whether at least 4 out of 5 advanced financial literacy questions (pertaining to knowledge about financial products and markets) are answered correctly.

[Insert Table 7 here.]

Separating the effect of numeracy from financial literacy and reflectiveness has no impact on the explanatory power of the two traits. Also, economic significance of cognitive reflection is unaffected, which is mirrored in stable average marginal effects on the right-hand side of Table 7. This finding is hardly surprising taking into account that numeracy has already been included before in the aggregate measure of financial literacy. This result is also in line with evidence by Campitelli (2010) and Koehler and James (2010) that the CRT remains predictive of decision making tasks when controlling for numeracy. While the regression results confirm the explanatory power of reflectiveness and advanced financial literacy for explaining the variation in consumers' credit decisions, numeracy (basic financial literacy) itself is not a significant predictor (column ii). This is in line with evidence provided by van Rooij, Lusardi, and Alessie (2011) who include basic financial literacy as a control variable but focus on advanced financial literacy in the context of households' decision to participate in the stock market.[19]

The results from the analysis of average marginal effects for the four usage groups confirm our previous findings: a lack of reflectiveness is associated with a higher probability of frequent overdraft usage, whereas advanced financial literacy has a diminishing effect on the probability for extensive short-term credit demand. As for the group of people that never uses overdraft credit, deciding impulsively decreases the probability to be in this group by three percentage points. The positive effect of advanced financial literacy is strong enough that its positive impact can compensate for impulsive decision making. The same phenomenon can be observed for the frequent usage group. An individual who is impulsive (without the tendency to reflect in the CRT) but possesses advanced financial knowledge has a lower probability to frequently use overdraft credit than a reflective individual lacking advanced financial literacy. We conclude that advanced financial literacy can compensate for lacking reflectiveness. This evidence provides a strong argument in favor of financial education.

[19] At first glance, our evidence seems to stand in contradiction to Gerardi, Goette, and Meier (2010), who provide evidence that borrowers' numerical ability predicts subprime mortgage delinquency and default. However, their measure of financial literacy does not include any advanced literacy questions at all, so that a potential impact of advanced financial literacy is omitted in their analysis.

4.3 Comparing credit lines to installment credit

So far, we have argued that impulsive people or those with lower financial literacy irrationally use a relatively expensive source of credit. For comparison, we also investigate the determinants of a cheaper, albeit less accessible and less liquid alternative: consumer installment credit. Generally, consumer installment credit is comparable to overdraft credit in terms of purchasing goals (SAVE explicitly cites purposes such as buying clothes, electronic devices, cars or vacation trips as examples for what was funded with the loan). We expect that behavioral traits do not shape the process of taking out consumer installment credit for three reasons: (i) while impulsive customers may want to consume more by means of consumer installment credit, banks' credit counselors can restrict customers' credit demand when the requested level of debt is unsustainable, (ii) requesting consumer installment credit is a much more deliberate decision, which involves paperwork and communication with the bank, compared to financing consumption by overdraft lines of credit, (iii) customers' financial literacy will probably not impact on credit demand, but on credit conditions (which we do not observe in our study).

While nearly 80 percent of respondents have access to credit lines, there can be groups of people that will not be granted consumer loans by credit providers. Therefore, credit access is an issue in the analysis of the demand for installment credit. In order to disentangle credit supply and credit demand we estimate a bivariate probit model with partial observability. This approach is necessary since we can only observe the cases in which a household demanded installment credit and has been granted the credit by the bank. When a household does not hold installment credit we cannot distinguish between the following reasons why: either a bank did not grant a loan because the customer is not creditworthy, or the person did not request a loan (or both). To mitigate this issue, we include information from the SAVE survey which provides a direct indicator capturing credit demand and constraints: In the survey, participants are asked whether they were fully or partly denied credit requests in the past five years, and whether they actually did request a loan. Furthermore, respondents can state whether they refrained from requesting credit for fear of denial. Close to half of the respondents indicate having requested credit during the five years preceding the survey, while 8 percent did not dare to ask for credit.

Table 10 documents the results of the bivariate probit model. On the household side, income,

wealth, age, and family structure matter for the decision to take out a loan for the same reasons which apply to the decision to use a credit line. Besides, it may matter whether an individual is self-employed because self-employment can require higher investments to be financed via credits; and we also control for the volume of the credit line granted, since it may work as a substitute. Furthermore, we include information on credit demand as described above. "Desire for credit" indicates whether an individual has requested a loan (abstracting from whether it was granted) or refrained from asking for credit for fear of denial. On the side of the bank we control for the customer's age, assets and outstanding loans (including the volume of overdraft lines of credit),[20] monthly income and rent as well as marital status and number of children because we assume that these variables enter a bank's credit worthiness evaluation. Whether a customer is self-employed may also matter on the side of the bank because banks will demand regular income streams. We also consider whether the "Bank received [a] request" for credit, which indicates whether the individual has requested a loan.

[Insert Table 10 here.]

The results of the bivariate probit regression confirm our expectations towards the irrelevance of cognitive reflection and financial literacy in the demand for consumer installment credit. With respect to socio-demographic characteristics, the results indicate that wealthier households have a lower demand for consumer installment credit and that those with higher income are more likely to have credit outstanding. As for the results on overdraft credit usage, the probability to have installment credit outstanding depends on household age. The same factors also play a role in the decision of the bank to grant credit, with income being the most important determinant. Unsurprisingly, households that requested credit are also more likely to have consumer installment credit outstanding. We also include a probit model as a mini robustness test in column (iii). Comparing the results from our analysis of consumer installment credit to our evidence on credit line usage, we conclude that accessibility and liquidity are features of overdraft lines of credit which are particularly inviting for behavioral biases. It is only in the analysis of credit lines that personal traits play a role.

[20] On the bank's side we do not include total net wealth, since not all items may be observable for the bank, e.g. company pension schemes or loans from family and friends.

4.4 Do groups without access to installment credit resort to credit lines?

Credit-constrained people, who do not have access to consumer loans, can be forced to rely on overdraft lines of credit when they experience financing needs. In order to find out whether constraints drive credit line usage we explicitly take into account self-reported credit constraints comparable to the approach in the previous section. We consider an individual to be objectively credit constrained if she has previously been partly or fully denied credit, and we distinguish subjectively constrained persons who refrained from requesting credit for fear of denial. Furthermore, in Table 11 we exclude groups which are potentially credit constrained because of low or fluctuating incomes: households with at least one unemployed person, and self-employed people.

[Insert Table 11 here.]

According to the results in Table 11 column (ii), access to consumer loans is an important aspect in the overdraft usage decision: households which are or feel credit constrained use overdraft lines of credit significantly more often than unconstrained households. In these cases, overdraft credit serves as a substitute for consumer installment credit. Especially respondents fearing credit denial (i.e. they are subjectively constrained) use overdraft credits more frequently, probably for convenience and ease. Excluding potentially credit constrained groups in columns (iii) and (iv) does not impact the relation between reflectiveness and overdraft credit use. The mitigating impact of financial literacy is slightly decreased in significance but nearly unaffected in economic terms.

4.5 A proxy for impulsiveness

In their famous experiments with four-year-old children who were to choose between the immediate reward of one cookie or a delayed gratification of two cookies Mischel and Peake (1988), Mischel and Rodriguez (1989) and Mischel and Peake (1990) demonstrate that individual differences in self-control measured at the pre-school stage predict the same person's behavior more than a decade later. Based on this insight we construct an alternative measure of impulsiveness using information regarding the respondent's childhood behavior (spending or saving their pocket money) to determine whether the adult person will tend to impulsive or reflective behavior. We expect people who spent their pocket money quickly in their childhood to also be impulsive spenders and therefore extensive credit line

users in their adulthood. This approach relies on the validity of the assumption that character traits (in particular reflectiveness and impulsiveness) are relatively stable in an individual person. More specific than the influential psychological literature mentioned before, Moffitta, Arseneault, Belsky, Dickson, Hancox, Harrington, Houts, Poulton, Roberts, Ross, Sears, Thomson, and Caspi (2011) present a longitudinal study which demonstrates that self-control in childhood predicts personal finance (among other criteria) at the age of 32. Therefore, our childhood-based measure of impulsiveness is an imperfect, but valid proxy for the impulsiveness of the adult respondent which is not caused by current spending behavior. It is unrelated to current consumption and saving decisions and hence exogenous to current credit decisions. To the best of our knowledge, this approach to identify determinants of decisions has not been used before.

Concretely, we asses respondents' impulsiveness by considering participants' agreement to the statement "[As a child] I used to spend my pocket money immediately" as the alternative proxy. For this purpose we enrich cross-sectional data from the 2009 SAVE survey with two additional variables from the 2008 questionnaire. Respondents can indicate their agreement to the statement on a scale ranging from 0 ("strongly disagree") to 10 ("agree completely"). High values imply higher impulsiveness. In our regressions we also include respondents' agreement to the statement "As a child I regularly received pocket money". Again, the respondents indicate their agreement on an 11 point Likert-Scale (0-10). According to the correlation analysis in Table 8 there is no overlap in our different proxies for impulsiveness. This finding is not very surprising given that they cover very different aspects: While our alternative proxy is a self-assessed measure capturing an individuals' behavior in childhood from which we draw conclusions about current cognitive reflection, the Cognitive Reflection Test is a performance based measure eliciting respondents' tendency to reflect and decide rationally and dismiss the intuitive but incorrect answer. The results of the regression analysis in which the CRT is replaced by this new impulsiveness proxy are presented in Table 12.

[Insert Table 12 here.]

Columns (i) and (ii) provide regression results when explanatory variables are of categorical nature, whereas columns (iii) and (iv) show results for dummy variable specifications. As hypothesized impulsiveness, which is approximated by immediate spending of pocket money in childhood, is associated positively with overdraft usage frequency. Whether a respondent received pocket money regularly

does not impact the results. The results from column (iii) (or column iv) compare closest to evidence presented in Table 5 column (iii) in which financial literacy is also approximated as indicator variable and based on all nine (basic and advanced) financial literacy questions.

From the robustness analysis we can infer that our conclusions drawn so far hold true when employing a completely different proxy for impulsiveness.

4.6 Alternative measurement of financial literacy

In the following, we document that the results of our study are not driven by the way we define our baseline financial literacy measure. As described above, this measure is derived from nine questions about financial issues contained in the 2009 SAVE survey, which are aggregated into a dummy variable (indicating whether more than the median number of answers were given correctly) or a score measure (counting the number of correct answers). While "I cannot/do not want to answer" is counted as a wrong answer, a missing answer turns the score to missing. In addition to this relatively simple and straightforward measure of financial literacy, we also follow van Rooij, Lusardi, and Alessie (2011) who use an iterated principal factor analysis to construct an index for financial literacy from the quiz questions. When applying factor analysis we assume that financial literacy (which we cannot observe directly) is not mirrored equally well in the answers to the quiz questions. For each question we construct a dummy variable which indicates the correct answer, so that we obtain 9 items which enter the factor analysis (missing values remain in the coding of the binary variables). Furthermore, we construct 9 items indicating whether a respondent decided to admit that he did not know the correct answer.

An indicative principal component analysis leads us to retain two main factors when analyzing all nine financial literacy items. Given the factor loadings from the iterative principal factor analysis of all nine items we find that one of the factors loads stronger on the basic financial literacy items whereas the other factor loads on the advanced items. We follow the approach by van Rooij, Lusardi, and Alessie (2011) and conduct two separate iterated factor analyses for basic and advanced financial literacy questions. We first only consider items based on correct answers to basic and advanced questions. In a second step we also include "Do not know" answers into the set of items for the iterated principal factor analysis. Details on factor loadings are included in Appendix G.

[Insert Table 13 here.]

Column (i) reproduces the results when measuring financial literacy by dummy variables. In column (ii) basic financial literacy (Numeracy) and advanced literacy are defined as scores. In columns (iii) and (iv) the results for the analysis of financial literacy measures obtained from principal factor analysis are displayed. As expected, the coefficient estimates on different financial literacy proxies are always negative. While basic financial literacy is not significant in any of the specifications, the coefficient estimates for the advanced financial literacy measures remain significant for the different specifications. We conclude that our results are not driven by the relatively simple approach we employ in our main regressions to measure financial literacy.

4.7 Evaluation of self-assessed measures of financial literacy and numeracy

In the earlier sections we advocate relying on performance measures instead of self-assessed measures based on suspicion that self-assessed measures may be biased or uninformative. We can also show that this choice is valid for the analysis presented, since the SAVE 2009 survey includes information on participants' self-assessed knowledge in financial matters and mathematical abilities. Specifically, respondents indicate their assessments on a scale from 1 "very low" to 7 "very high". The distributions of self-assessed skills are presented in Figure 2.

[Insert Figure 2 here.]

If the mid-category 4 indicates average knowledge, 19 % of respondents assess their financial literacy to be below average, 23 % think they have average financial knowledge and 50 % say that their financial literacy is better than average. The distribution of self-assessed mathematical abilities is skewed to the left even stronger with 57 % of respondents thinking their skills to be above average. These results can be compared to the performance measures for financial literacy and the CRT (Table 3 and Table 2), for financial literacy self assessments comparing well to the distribution of answers on the financial literacy performance test. Both are skewed to the left and actually more than 50 % of respondents can answer more than half of the questions correct. For the CRT the contrary is true: A large fraction of 45% does not answer even one of the CRT questions correctly. The rest of the distribution is rather flat and decreasing. This observation indicates that (self-assessed) mathematical abilities and the

CRT measure different traits, as we discussed when using questions from the financial literacy test to proxy for math skills. That the CRT assesses a trait beyond mathematical skills is also mirrored in the correlation analysis provided in Table 14.

[Insert Table 14 here.]

Self-assessed mathematical skills are correlated to the CRT but much lower than with advanced or basic financial literacy. As expected, self-assessed financial knowledge is correlated more closely with the performance measure for advanced financial literacy than with basic financial literacy. The correlation between self-assessed financial knowledge and mathematical skills is a little lower than the correlation between basic and advanced financial literacy, indicating that using basic financial literacy as proxy for math skills may not be completely selective. Table 15 analyzes the predictive power of the self-assessed measures compared to the performance measures.

[Insert Table 15 here.]

In Table 15, columns (i) to (iii) analyze whether self-assessed math skills are a better predictor for credit line usage than thinking dispositions as measured by the CRT. Although results for reported math skills have the expected sign, they have less predictive power in economic magnitude as well as in significance. When including reported math skills and CRT performance simultaneously, the self-reported skills become insignificant, while the effect of cognitive reflection is nearly unchanged. The analysis for self-assessed versus test based financial literacy (Table 15 columns (iv) to (vi)) yields qualitatively analogous results. However, reported financial knowledge is not a significant predictor for short-term credit usage decisions even when no other explanatory variables are included. The last two columns of Table 15 analyze whether self-assessed math skills are more selective than financial literacy. Although this seems to be the case (the coefficient on advanced financial literacy increases from column (vii) to (viii) while the coefficient on the CRT results decreases slightly) the quantitative difference is very small and statistical significance is unchanged. In our analyses we preferred to stick to a coherent approach which is why we only include performance measures and not a mixture including self-assessed measures as explanatory variables.

4.8 Further self-assessed personality traits

Other personal traits besides cognitive reflection and financial literacy possibly matter for short term credit decisions. A set of traits which quickly come to mind are the "Big 5" personality traits in behavioral finance. However, the SAVE survey does not elicit these traits.[21] In the survey wave 2007 SAVE participants indicated whether they focus rather on urgent matters or future problems and whether they prefer tasks with immediate results over those with results in the far future. These variables can be thought of as crude measures for respondents' time preferences. In 2008 respondents furthermore align themselves between two extreme personalities: easy-going versus determined and spontaneous opposed to pensive. The distribution of self-assessments is provided in Figure 3.

[Insert Figure 3 here.]

The results in the left hand panel of Figure 3 hint at a mid-category bias for the urgent isses/future problems and immediate/future results questions. The mid-category (the value of 5) was chosen by a large group of about 20 percent for each of the two questions. Still, for the urgent issues/future problems question there is more mass to the left of the distribution indicating that respondents rather disagree on the statement that future problems will resolve themselves. On the contrary, participants agree more on that they prefer immediate results, since the distribution of answers is slightly skewed to the left (when abstracting from the mid category). For the extreme personalities depicted in the right hand panel of Figure 3 there is again a large fraction in the mid-category. However, both distributions are clearly skewed to the left, indicating that respondents tend to picture themselves as determined and pensive personalities. It is likely that these latter results are partly driven by social desirability of the traits. Unreported correlational analyses show that theses additional traits relate only weakly to cognitive reflection and financial literacy. Although some correlations are significant, they are low (around 5% in absolute terms). Concerning the relation to credit line usage it is reasonable to expect that people focussing on more urgent instead of future problems and preferring immediate opposed

[21] Unreported evidence obtained from personal correspondence with the authors of the related studies by Andersson, Holm, Tyran, and Wengström (2013) and Fernandes, Lynch, and Netemeyer (2014) documents that the CRT is insignificantly or at most weakly correlated (below 10% in absolute terms) with the Big 5 personality traits. This result is comforting in the sense that we can rule out that the CRT captures another underlying trait driving our findings. Furthermore, the performance results from the CRT are positively correlated to the self-assessed Need For Cognition scale, which can be expected and is reassuring. We thank Daniel Fernandes and Erik Wengström for providing us with correlation tables with complementing results.

to future results will rely on credit lines more often. Determined and pensive characters are likely to use credit lines less often. The results from including the additional variables into the regression framework are documented in Table 16.

[Insert Table 16 here.]

Comparing the results to the baseline specification reprinted in column (i) of Table 16 first shows, that our explanatory variables cognitive reflection and financial literacy are not affected in magnitude or significance by the inclusion of the additional personality traits. In columns (ii) and (iii) the variables assessing a focus on urgent problems and immediate results turn out to be insignificant predictors of credit line usage. Trying to alleviate the potential mid-category bias in the specification in column (iii) by including an indicator variable instead of the exact scores does change this result. Also, the additional variables do not improve the R-squared of the model. On the contrary, the personality variables identifying "easy-going/determined" and "spontaneous/pensive" personalities enter significantly and with the expected sign in column (iv) and the R-squared of the model increases slightly. We conclude that determined or pensive personalities are less likely to use credit lines and that these characteristics do not subsume the impact of cognitive reflection or financial literacy.

4.9 Alternative econometric approaches and sampling issues

Our dependent variable from the SAVE data which captures overdraft credit usage frequency is censored and of categorical nature. Therefore, ordered probit estimation is the natural choice for a regression model. However, to make sure that the results on the negative relations between reflectiveness or financial literacy and overdraft credit usage frequency are not due to the ordered probit approach, we also conduct simpler regression models, reported in Table 17. Columns (i) and (ii) display the coefficient estimates obtained from an OLS regression. In columns (iii) and (iv) we reduce the information on overdraft usage frequency to a dummy variable indicating whether the credit line has been used frequently in the preceding year (i.e. at least 6 times or constantly), so that we can run probit regressions instead of ordered probit estimations. The latter approach also addresses the concern that people probably do not now how many times exactly they were overdrawn. However, it is very likely that they know when they were frequently overdrawn.

[Insert Table 17 here.]

Our results are qualitatively similar to those from the baseline approach reported in Tables 4 and 5. The coefficient estimates of the OLS model are much more straightforward to interpret compared to ordered probit results. At first, the intercept seems very high considering that the dependent variable can only take on values between 1 (never use overdraft credit) and 4 (more frequently than six times a year or constantly in overdraft use). However, this fact becomes plausible when taking into account that wealth enters the regression negatively. The average respondent age of 55 years further reduces the starting level of the intercept. The OLS regression results once more confirm the compensational effect of advanced financial literacy for a lack of reflectiveness. Statistical significance remains unaffected compared to the ordered probit approach, and coefficient estimates are also similar.

The analyses in Table 18 is triggered by two features of the SAVE data. First, missing values are imputed in SAVE. We can therefore analyze whether our results are influenced by a non-response bias stemming from the control variables in Table 18 columns (i) and (ii).[22] For this purpose, we make use of five imputed data sets provided by MEA. While we do not rely on imputed values for our dependent and explanatory variables, we use them for the control variables. We run ordered probit regressions on all five imputed data sets. The results are obtained by using Rubin's Method (Rubin, 1987). Second, SAVE is based on two different pools of respondents: an "access panel" and a "random route sample". Some papers solely focus on the random route sample (Bucher-Koenen and Lusardi, 2011; Bucher-Koenen and Ziegelmeyer, forthcoming). We verify that our results are not driven by systematic differences in the sample populations by including a variable indicating to which population an observation belongs.

We can reject the skepticism that our results are influenced by a non-response bias. The results from repeating our analysis with imputed data in Table 18 columns (i) and (ii) are very similar to our estimations when excluding observations with missing data. The value added by the comparably extensive analysis therefore appears to be negligible. Furthermore, our results are not influenced by potential differences between the two sampling populations. The variable identifying the sub-populations of the sample is insignificant and the coefficients of the explanatory variables are unaffected.

[22] Please also refer to Appendix C for descriptive statistics in the sample with the different data filters applied.

5 Conclusion

Credit lines are an expensive but very flexible credit product to bridge short term liquidity gaps. However, concerns are that households do not reflect on the consequences of their consumption decisions when using credit lines. Our analysis undermines this worry: We document that the frequent or even continuous use of costly credit lines is more likely for people who give intuitive but incorrect answers in the Cognitive Reflection Test. Our results also add to the discussion of the merits of financial literacy. Although, in a first step we provide evidence that thinking dispositions relate to credit decisions, we find that better financial literacy is associated with less frequent credit line use. Therefore, financial literacy is not dominated by being impulsive and the mitigating effect of financial literacy outweighs the adverse effect of impulsive decisions.

We summarize our results for consumers who very frequently or constantly use credit lines. According to our findings people who answer impulsively to one more question in the Cognitive Reflection Test are 10% more likely to be in this frequent users group. However, if they - at the same time - score one question better than average in the financial literacy test they will end up with a 10% lower probability to be in the very frequent usage group than an average individual.

Still, our results find the group of individuals without a tendency to reflect and with low financial sophistication to be at risk to incur significant costs on credit lines or even end up in a cycle of debt. Consumer protection policies can apply different means targeting behavioral or skill-related drivers of credit decisions: behavioral arguments typically call for tighter regulations of financial activities such as those regulations on overdrafts implemented by the Federal Reserve Board in the U.S. in 2009. Two regulations were amended requiring the regular disclosure of total overdraft fees and customers' active consents before charging overdraft fees on ATM and point-of-sale transactions. While the costs of credit lines are also regularly disclosed in Germany, the latter regulation may be especially useful in a context where cognitive reflection matters for financial decisions. Requiring active consent could force consumers into deliberate and reflective decision making instead of impulsive or automatic decisions.

In contrast, evidence in favor of financial literacy as the driver of financial decisions is often taken as a proof that financial education is improving financial decisions (van Rooij, Lusardi, and Alessie, 2011; Guiso and Jappelli, 2009; Bucher-Koenen and Lusardi, 2011). Analyzing credit behavior of

young adults in states which newly introduced personal finance education into the curricula Brown, Collins, Schmeiser, and Urban (2014) find that financial education improves the former students' credit scores and lowers their delinquency rates. Our results are comforting in the sense that financial literacy is beneficial independently from thinking dispositions.

References

Alba, J. W., and J. W. Hutchinson (1987): "Dimensions of consumer expertise," *Journal of Consumer Research*, 13(4), 441–454.

Andersson, O., H. J. Holm, J.-R. Tyran, and E. Wengström (2013): "Risk Aversion Relates to Cognitive Ability: Fact or Fiction," *IFN Working Paper No. 964*.

Brown, A. M., J. M. Collins, M. D. Schmeiser, and C. Urban (2014): "State Mandated Financial Education and the Credit Behavior of Young Adults," *Finance and Economics Discussion Series No. 2014-68, Divisions of Research & Statistics and Monetary Affairs Federal Reserve Board, Washington, D.C.*

Börsch-Supan, A., M. Coppola, L. Essig, A. Eymann, and D. Schunk (2009): "The German SAVE Study - Design and Results," *Mannheim: Mannheim Institute for the Economics of Aging.*

Bucher-Koenen, T., and A. Lusardi (2011): "Financial Literacy and Retirement Planning in Germany," *Journal of Pension Economics and Finance*, 10(4), 565–584.

Bucher-Koenen, T., and M. Ziegelmeyer (forthcoming): "Once Burned, Twice Shy? Financial Literacy and Wealth Losses during the Financial Crisis," *Review of Finance.*

Campitelli, G., . L. M. (2010): "Correlations of cognitive reflection with judgments and choices," *Judgment and Decision Making*, 5(3), 182–191.

Cokely, E. T., and C. M. Kelley (2011): "Cognitive abilities and superior decision making under risk: A protocol analysis and process model evaluation," *Judgment and Decision Making*, 4(1), 20–33.

Disney, R., and J. Gathergood (2011): "Financial Literacy and Indebtedness: New Evidence for UK Consumers," *University of Nottingham Working Paper.*

——— (2013): "Financial literacy and consumer credit portfolios," *Journal of Banking and Finance*, 37(7), 2246–2254.

Fernandes, D., J. G. Lynch, and R. G. Netemeyer (2014): "Financial Literacy, Financial Education and Downstream Financial Behaviors," *Management Science*, 60(8), 1861–1883.

Fredrick, S. (2005): "Cognitive Reflection and Decision Making," *Journal of Economic Perspectives*, 19(4), 25–42.

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

Glaser, M., and A. Klos (2012): "Causal Evidence on Regular Internet Use and Stock Market Participation," *Working Paper, SAVE-PHF Conference 2012.*

Guiso, L., and T. Jappelli (2009): "Financial Literacy and Portfolio Diversification," *Working Paper.*

Hayashi, F., and E. Cuddy (2014): "Recurrent Overdrafts: A Deliberate Decision by Some Prepaid Cardholders?," *Federal Reserve Bank of Kansas City Working Paper No. 14-08.*

Kahneman, D. (2011): *Thinking, Fast and Slow.* Farrar, Straus and Giroux, New York.

Kahneman, D., and S. Frederick (2002): *Heuristics and biases: The psychology of intuitive judgment*chap. Representativeness revisited: Attribute substitution in intuitive judgment, p. 49Ű81. Cambridge University Press, New York.

Klee, E. (2008): "How People Pay: Evidence From Grocery Store Data," *Journal of Monetary Economics*, 55(3), 526–541.

Koehler, D. J., and G. James (2010): "Probability matching and strategy availability," *Memory an Cognition*, 38(6), 667–676.

Koulayev, S., M. Rysman, S. Schuh, and J. Stavins (2012): "Explaining Adoption and Use of Payment Instruments by U.S. Consumers," *Working Paper*.

Lusardi, A. (2012): "Numeracy, Financial Literacy, and Financial Decion-Making," *NBER Working Paper No. 17821*.

Lusardi, A., and O. S. Mitchell (2007): "Baby Boomer Retirement Security: The Roles of Planning, Financial Literacy, and Housing Wealth," *Journal of Monetary Economics*, 54(1), 205–224.

——— (2008): "Planning and Financial Literacy: How Do Women Fare?," *American Economic Review*, 98(2), 413–417.

——— (2011): "Financial literacy around the world: an overview," *Journal of Pension Economics and Finance*, 10(4), 497–508.

——— (2013): "Older Adult Debt and Financial Frailty," *Michigan Retirement Research Center Research Paper No. 2013-291*.

Lusardi, A., and P. Tufano (2009): "Debt Literacy, Financial Experiences, and Overindebtedness," *CeRP Working Paper 83/09*, (83).

McClure, S. M., D. I. Laibson, G. Loewenstein, and J. D. Cohen (2004): "Separate Neural Systems Value Immediate and Delayed Monetary Rewards," *Science*, 306(5695), 503–507.

Mischel, W., Y. S., and P. K. Peake (1988): "The Nature of Adolescent Competencies Predicted by Preschool Delay of Gratification," *Journal of Personality and Social Psychology*, 54(4), 687–696.

——— (1990): "Predicting Adolescent Cognitive and Self-Regulatory Competencies from Preschool Delay of Gratification: Identifying Diagnostic Conditions," *Developmental Psychology*, 26(6), 978–986.

Mischel, W., Y. S., and M. L. Rodriguez (1989): "Delay of Gratification in Children," *Science*, 233(4907), 933–938.

Modigliani, F., and R. Brumberg (1954): "Utility Analysis and the Consumption Function: An Interpretation of Cross-section Data," in *Post-Keynesian Economics*, ed. by K. K. Kurihara. New Brunswick.

Moffitta, T. E., L. Arseneault, D. Belsky, N. Dickson, R. J. Hancox, H. Harrington, R. Houts, R. Poulton, B. W. Roberts, S. Ross, M. R. Sears, W. M. Thomson, and A. Caspi (2011): "A Gradient of Childhood Self-Control Predicts Health, Wealth, and Public Safety," *Proceedings of the National Academy of Sciences of the United States of America*, 108(7), 2693–2698.

Oechssler, J., R. A. . S. P. W. (2009): "Cognitive abilities and behavioral biases," *Journal of Economic Behavior and Organization*, 72(1), 147–152.

Poirier, D. (1980): "Partial Observabilit in Bivariate Probit Models," *Journal of Econometrics*, 12, 210–217.

Rubin, D. (1987): *Multiple Imputation for Nonresponse in Surveys*. Wiley, New York.

Schelling, T. C. (1984): "Self-Command in Practice, in Policy, and in a Theory of Rational Choice," *American Economic Review*, 74(2), 1–11.

Shefrin, H., and R. H. Thaler (1988): "The Behavioral Life-Cycle Hypothesis," *Economic Inquiry*, 26(4), 609–643.

Stango, V., and J. Zinman (2014): "Limited and Varying Consumer Attention: Evidence from Shocks to the Salience of Bank Overdraft Fees," *Review of Financial Studies*, 27, 990–1030.

Stanovich, K., and R. West (2000): "Individual Differences in Reasoning: Implications for the Rationality Debate?," *Behavioral and Brain Sciences*, 22(5), 645–726.

Toplak, M. E., R. F. West, and K. E. Stanovich (2012): "The Cognitive Reflection Test as a predictor of performance on heuristics-and-biases tasks," *Memory and Cognition*, 39(7), 1275–1289.

van Rooij, M., A. Lusardi, and R. Alessie (2011): "Financial Literacy and Stock Market Participation," *Journal of Financial Economics*, 101(2), 449–472.

van Rooij, M. C., A. Lusardi, and R. J. Alessie (2012): "Financial Literacy, Retirement Planning and Household Wealth," *Economic Journal*, 122, 449–478.

Winston, G. C. (1980): "Addiction and Backsliding: A Theory of Compulsive Consumption," *Journal of Economic Behavior and Organization*, 1, 295–324.

Table 1: Descriptive statistics on credit line usage

The table shows the distribution of household credit line usage frequency as indicated in the SAVE 2009 survey. We report usage frequency conditional on access to an overdraft line of credit.

	Frequency	Percent
never	811	46.8
1-3 times p.a.	438	25.3
4-6 times p.a.	152	8.8
more often or constantly	295	17.0
no answer	37	2.1
Total	1,733	100

Figure 1: Distribution of credit line usage 2007-2009

The figure displays the distribution of credit line usage in the years 2007-2009. Respondents are asked: "In the last year, how often did you use the credit line on your current account?" They can indicate their answers according to the groups named on the x-axis on the plot.

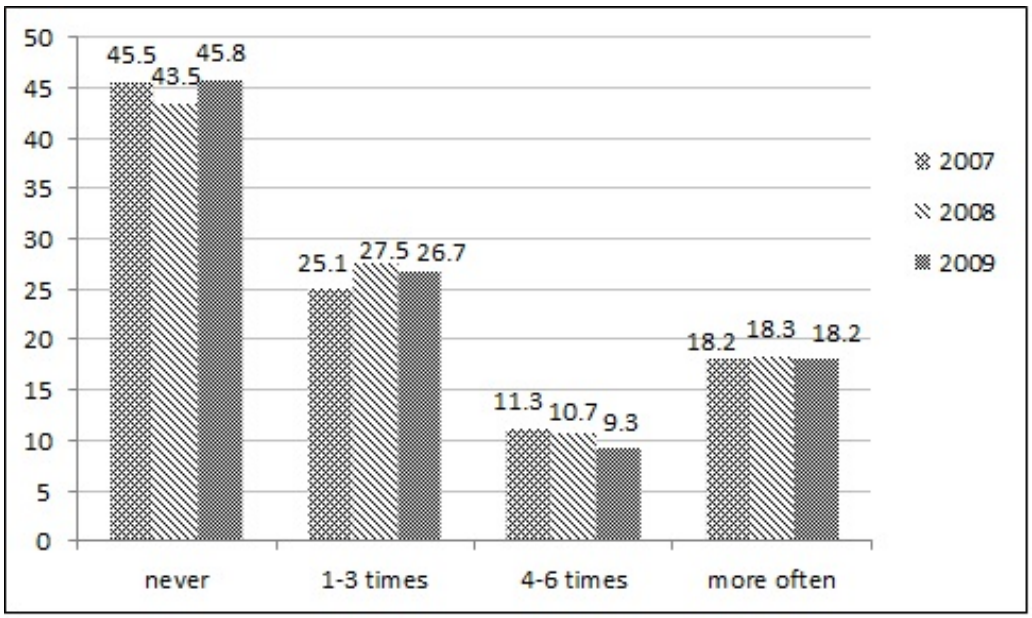

Table 2: Cognitive Reflection Test by Fredrick (2005)- empirical distribution of answers

Panel A reports the proportion of households providing correct, impulsive incorrect and non-impulsive incorrect answers as well as the proportion of refusals. The questionnaire does not provide the possibility to actively state that one prefers not to answer. Panel B shows which percentages answer correctly (incorrectly/do not answer at all) to a given number of questions, i.e. if no question is answered correctly some of the three questions of the CRT were either not or falsely answered.

Panel A: Distribution of answers in the Cognitive Reflection Test (N= 2,222)				
	Correct	Impulsive	Incorrect	Refusal
1) Bat and ball	19.4	66.7	3.1	10.8
2) Production time	40.3	32.1	11.8	15.8
3) Lily pond	42.6	33.3	6.3	17.8
Panel B: Summary of responses - percentages of numbers of correct, impulsive and missing answers				
	None	1	2	All
Correct	45.1	21.4	19.6	13.9
Incorrect	23.9	25.5	24.6	26.3
Refusal	78.8	7.2	4.9	9.1

Table 3: Financial literacy - empirical distribution of answers to nine questions

Panel A reports the proportion of households providing correct and incorrect answers as well as the proportion of "I cannot/do not want to answer" and refusals to answer for each of the nine financial literacy questions. Panel B shows which percentages answer correctly (incorrectly/do not know) to a given number of questions, i.e. if no question is answered correctly, the answers were either wrong, do not know or complete refusal or a combination of these possibilities. Means in the Panel B do not add up to nine due to refusals.

Panel A: Distribution of answers in the financial literacy test (N= 2,222)

	Correct	Incorrect	Do not know	Refusal
Basic FL questions				
1) Interest (2%)	82.8	5.3	9.1	2.8
2) Interest (20%)	63.7	23.2	10.7	2.5
3) Inflation	78.1	4.0	15.0	2.9
4) Money illusion	54.8	31.1	11.3	2.7
Advanced FL questions				
1) Return volatility	70.0	9.4	17.1	3.6
2) Stock market	51.0	16.2	29.6	3.2
3) Diversification	63.7	6.4	27.5	2.4
4) Balanced funds	44.7	7.1	44.6	3.7
5) Bond prices	9.4	52.9	33.4	4.3

Panel B: Summary of responses - percentages of numbers of correct, incorrect and do not know answers

	None	1	2	3	4	5	6	7	8	All	Mean
Correct	8.1	3.7	5.6	8.1	10.6	10.9	15.6	16.1	17.1	4.5	5.18
Incorrect	20.3	35.3	24.6	11.9	5.2	2.1	0.5	0.1	-	-	1.55
Do not know	42.0	16.0	11.2	7.5	7.5	4.7	3.0	2.5	1.6	4.0	1.98

Table 4: Ordered probit regression of overdraft usage frequency on CRT results

This table shows our baseline ordered probit regression of overdraft credit usage frequency on individuals' tendency to reflect (CRT score). Respondents indicate their overdraft credit usage frequency by choosing among four usage frequency intervals: "never", "1 to 3 times a year", "4 to 6 times a year", "more often or constantly". We therefore employ an ordered probit estimation procedure with heteroscedasticity-robust standard errors in all regressions. While in the left hand panel columns (i) to (iii) directly display the probit coefficients, the right hand panel presents average marginal effects for the four usage groups. We identify more impulsive and more reflective personalities with the Cognitive Reflection Test by Fredrick (2005). Counting the correct responses in the CRT yields test scores ranging from 0 (impulsive) to 3 (reflective). When at least one answer to the questions is missing, the score will also be missing. Concerning the occupational control variables, white-collar employment is taken as the base group. Unemployment is included as a dummy variable indicating whether the respondent and/or the spouse is unemployed. Lower secondary education is excluded from the educational variables. Economics education is a self-assessed measure from 0 indicating "no economics education at all" to 7 "very intensive education" in school or other vocational training. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	Ordered probit			Average marginal effects				Ordered probit
	(i)	(ii)	(iii)	overdraft usage frequency				CRT(-)
				"never"	"1-3 times"	"4-6 times"	"more often"	
CRT score		-0.088***	-0.098***	0.035***	-0.006***	-0.006***	-0.022***	
		(0.032)	(0.033)	(0.012)	(0.002)	(0.002)	(0.008)	
CRT(-) score								0.093***
								(0.034)
2nd wealth quartile	-0.501***	-0.476***	-0.495***	0.175***	-0.030***	-0.032***	-0.112***	-0.495***
	(0.105)	(0.106)	(0.107)	(0.037)	(0.008)	(0.007)	(0.024)	(0.107)
3rd wealth quartile	-0.398***	-0.359***	-0.395***	0.139***	-0.024***	-0.026***	-0.089***	-0.393***
	(0.103)	(0.104)	(0.105)	(0.037)	(0.007)	(0.007)	(0.024)	(0.105)
4th wealth quartile	-0.741***	-0.699***	-0.744***	0.262***	-0.046***	-0.048***	-0.168***	-0.743***
	(0.106)	(0.108)	(0.110)	(0.037)	(0.008)	(0.008)	(0.025)	(0.111)
Log income	-0.084	-0.059	-0.078	0.027	-0.005	-0.005	-0.018	-0.082
	(0.067)	(0.068)	(0.079)	(0.028)	(0.005)	(0.005)	(0.018)	(0.079)
Age	0.051***	0.048**	0.048**	-0.017**	0.003**	0.003**	0.011**	0.049**
	(0.019)	(0.019)	(0.019)	(0.007)	(0.001)	(0.001)	(0.004)	(0.019)
Age^2	-0.068***	-0.066***	-0.068***	0.024***	-0.004***	-0.004***	-0.015***	-0.068***
	(0.017)	(0.017)	(0.019)	(0.007)	(0.001)	(0.001)	(0.004)	(0.019)
Gender (male)			0.098	-0.035	0.006	0.006	0.022	0.097
			(0.073)	(0.026)	(0.005)	(0.005)	(0.017)	(0.073)
Couple			-0.036	0.013	-0.002	-0.002	-0.008	-0.039
			(0.095)	(0.034)	(0.006)	(0.006)	(0.022)	(0.095)
Number of children			0.116***	-0.041***	0.007***	0.007***	0.026***	0.113***
			(0.042)	(0.015)	(0.003)	(0.003)	(0.010)	(0.042)
Blue-collar worker			-0.104	0.037	-0.006	-0.007	-0.024	-0.108
			(0.121)	(0.043)	(0.007)	(0.008)	(0.027)	(0.121)
Civil servant			0.055	-0.020	0.003	0.004	0.013	0.048
			(0.161)	(0.057)	(0.010)	(0.010)	(0.036)	(0.161)
Self-employed			0.302	-0.106	0.019	0.020	0.068	0.295
			(0.206)	(0.073)	(0.013)	(0.013)	(0.047)	(0.205)
Retired			0.167	-0.059	0.010	0.011	0.038	0.161
			(0.124)	(0.044)	(0.008)	(0.008)	(0.028)	(0.125)
Other occupation			-0.026	0.009	-0.002	-0.002	-0.006	-0.030
			(0.134)	(0.047)	(0.008)	(0.009)	(0.030)	(0.134)
Unemployed			0.063	-0.022	0.004	0.004	0.014	0.057
			(0.185)	(0.065)	(0.011)	(0.012)	(0.042)	(0.185)
Mid-level education			0.112	-0.039	0.007	0.007	0.025	0.110
			(0.089)	(0.031)	(0.006)	(0.006)	(0.020)	(0.089)
A-level education			0.063	-0.022	0.004	0.004	0.014	0.056
			(0.098)	(0.034)	(0.006)	(0.006)	(0.022)	(0.098)
Economics education			-0.033	0.012	-0.002	-0.002	-0.007	-0.034
			(0.022)	(0.008)	(0.001)	(0.001)	(0.005)	(0.022)
μ_1	-0.498	-0.498	-0.613					-0.375
	(0.675)	(0.671)	(0.718)					(0.726)
μ_2	0.233	0.235	0.126					0.365
	(0.676)	(0.672)	(0.718)					(0.726)
μ_3	0.589	0.593	0.489					0.726
	(0.675)	(0.672)	(0.718)					(0.726)
N	1120	1120	1120					1120
$PseudoR^2$	0.139	0.144	0.156					0.155

Table 5: Ordered probit regression - impact of cognitive reflection and financial literacy

In the left hand panel we disentangle the effects of cognitive reflection and financial literacy on credit usage. To facilitate interpretation we define "Financial literacy" as dummy variable indicating whether at least seven out of nine financial literacy questions (more than the median number of questions) are answered correctly. For brevity purposes we only report the coefficients on the most important control variables, although all demographic and educational control variables are included in regression specifications. Robust standard errors are given in parentheses. In the right hand panel we report marginal effects for the full specification from column (iii) for different usage frequencies of credit lines. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	Ordered probit results			Average marginal effects			
	(i)	(ii)	(iii)	overdraft usage frequency			
				"never"	"1-3 times"	"4-6 times"	"more often"
CRT score	-0.098***		-0.082**	0.029**	-0.005**	-0.005**	-0.018**
	(0.033)		(0.034)	(0.012)	(0.002)	(0.002)	(0.008)
Financial literacy		-0.208***	-0.165**	0.058**	-0.010**	-0.011**	-0.037**
		(0.076)	(0.079)	(0.028)	(0.005)	(0.005)	(0.018)
2nd wealth quartile	-0.495***	-0.507***	-0.497***	0.175***	-0.030***	-0.032***	-0.112***
	(0.107)	(0.107)	(0.107)	(0.037)	(0.008)	(0.007)	(0.024)
3rd wealth quartile	-0.395***	-0.410***	-0.384***	0.135***	-0.023***	-0.025***	-0.087***
	(0.105)	(0.104)	(0.105)	(0.037)	(0.007)	(0.007)	(0.024)
4th wealth quartile	-0.744***	-0.749***	-0.725***	0.255***	-0.044***	-0.047***	-0.163***
	(0.110)	(0.110)	(0.110)	(0.037)	(0.008)	(0.008)	(0.025)
Log income	-0.078	-0.063	-0.056	0.020	-0.003	-0.004	-0.013
	(0.079)	(0.079)	(0.079)	(0.028)	(0.005)	(0.005)	(0.018)
Age	0.048**	0.049**	0.047**	-0.017**	0.003**	0.003**	0.011**
	(0.019)	(0.019)	(0.020)	(0.007)	(0.001)	(0.001)	(0.004)
Age^2	-0.068***	-0.068***	-0.067***	0.023***	-0.004***	-0.004***	-0.015***
	(0.019)	(0.019)	(0.019)	(0.007)	(0.001)	(0.001)	(0.004)
Gender (male)	0.098	0.109	0.121	-0.042	0.007	0.008	0.027
	(0.073)	(0.074)	(0.074)	(0.026)	(0.005)	(0.005)	(0.017)
Couple	-0.036	-0.041	-0.040	0.014	-0.002	-0.003	-0.009
	(0.095)	(0.094)	(0.095)	(0.033)	(0.006)	(0.006)	(0.021)
Number of children	0.116***	0.108***	0.112***	-0.039***	0.007**	0.007***	0.025***
	(0.042)	(0.042)	(0.042)	(0.015)	(0.003)	(0.003)	(0.010)
Occupational demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
μ_1	-0.613	-0.477	-0.520				
	(0.718)	(0.721)	(0.720)				
μ_2	0.126	0.262	0.222				
	(0.718)	(0.721)	(0.720)				
μ_2	0.489	0.625	0.586				
	(0.718)	(0.721)	(0.720)				
N	1120	1120	1120				
Pseudo R^2	0.156	0.157	0.160				

Table 6: Predicted probabilities analysis for the impact of cognitive reflection and financial literacy

To calculate the predicted probabilities we rely on a reduced model, since from Table 4 we know, that the most important variables explain already as much of the variation as does the full model specification. Working with a reduced model hast the advantage, that fewer household characteristics need to be fixed. For the reduced model specification we consider the CRT, financial literacy and the control variables wealth, log income, age and age^2. We base the regression on the observations also included in the full specification model. The predicted probabilities are calculated for a household with average income and average age in the second wealth decile.

credit line use	CRT	Financial literacy low	Financial literacy high	Difference absolute	Difference relative
never	0	0.434	0.495	0.061	0.141
	1	0.510	0.571	0.061	0.120
	2	0.483	0.545	0.061	0.127
	3	0.531	0.592	0.061	0.114
frequent	0	0.177	0.139	-0.037	-0.210
	1	0.131	0.101	-0.030	-0.229
	2	0.146	0.114	-0.032	-0.222
	3	0.120	0.092	-0.028	-0.234

Table 7: Robustness: Ordered probit regression - analyzing components of financial literacy

In the left hand panel we regress credit line usage on a proxy for numeracy (deducted from basic financial literacy items), a measure for advanced financial literacy, and the CRT score in order to consider the impact of financial skills. "Numeracy" pertains to 4 basic financial literacy questions, whereas "advanced literacy" covers five advanced financial knowledge questions. Both literacy variables indicate whether more than the median number of questions have been answered correctly (i.e. all 4 basic questions and at least 4 out of 5 advanced questions). For brevity purposes we only report the coefficients on the most important control variables, although all demographic and educational control variables are included in regression specifications. In the right hand panel we report marginal effects for the full specification from column (ii) for different usage frequencies of credit lines. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	Ordered probit results		Average marginal effects			
	(i)	(ii)	overdraft usage frequency			
			"never"	"1-3 times"	"4-6 times"	"more often"
CRT score		-0.083**	0.029**	-0.005**	-0.005**	-0.019**
		(0.034)	(0.012)	(0.002)	(0.002)	(0.008)
Numeracy	-0.065	-0.031	0.011	-0.002	-0.002	-0.007
	(0.073)	(0.074)	(0.026)	(0.005)	(0.005)	(0.017)
Advanced literacy	-0.183**	-0.155**	0.055**	-0.010*	-0.010*	-0.035**
	(0.077)	(0.079)	(0.027)	(0.005)	(0.005)	(0.018)
2nd wealth quartile	-0.508***	-0.492***	0.173***	-0.030***	-0.032***	-0.111***
	(0.107)	(0.107)	(0.037)	(0.008)	(0.007)	(0.024)
3rd wealth quartile	-0.398***	-0.374***	0.131***	-0.023***	-0.024***	-0.084***
	(0.105)	(0.106)	(0.037)	(0.007)	(0.007)	(0.024)
4th wealth quartile	-0.741***	-0.717***	0.252***	-0.044***	-0.046***	-0.162***
	(0.109)	(0.110)	(0.037)	(0.008)	(0.008)	(0.025)
Log income	-0.058	-0.052	0.018	-0.003	-0.003	-0.012
	(0.079)	(0.079)	(0.028)	(0.005)	(0.005)	(0.018)
Age	0.050**	0.048**	-0.017**	0.003**	0.003**	0.011**
	(0.020)	(0.020)	(0.007)	(0.001)	(0.001)	(0.004)
Age^2	-0.069***	-0.068***	0.024***	-0.004***	-0.004***	-0.015***
	(0.019)	(0.019)	(0.007)	(0.001)	(0.001)	(0.004)
Gender (male)	0.108	0.121	-0.043	0.007	0.008	0.027
	(0.074)	(0.074)	(0.026)	(0.005)	(0.005)	(0.017)
Couple	-0.043	-0.043	0.015	-0.003	-0.003	-0.010
	(0.095)	(0.095)	(0.033)	(0.006)	(0.006)	(0.021)
Number of children	0.110***	0.113***	-0.040***	0.007**	0.007***	0.026***
	(0.042)	(0.043)	(0.015)	(0.003)	(0.003)	(0.010)
Occupational demographics	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	Yes	Yes	Yes	Yes	Yes	Yes
μ_1	-0.401	-0.447				
	(0.724)	(0.724)				
μ_2	0.337	0.294				
	(0.724)	(0.725)				
μ_3	0.697	0.655				
	(0.725)	(0.725)				
N	1118	1118				
Pseudo R^2	0.156	0.160				

Table 8: Robustness: Correlations of alternative financial literacy proxies and competing explanatory variables

This table shows Pearson correlations between the different proxies for impulsiveness, financial literacy and numeracy. Spearman rank correlations are very similar, while Kendall's Tau is qualitatively similar but much smaller for all relations. All variables are defined as scores. "PM spending" refers to an alternative measure for impulsiveness introduced in robustness section 4.5.

	CRT	Full FL	Basic FL	Adv. FL	Economics education
Full FL score	0.41				
Basic FL score	0.34	0.85			
Advanced FL score	0.35	0.91	0.56		
Economics education	0.06	0.16	0.10	0.18	
PM spending	-0.02	0.04	0.01	0.06	0.01

Table 9: Robustness: Considering proxy variables for cognitive abilities

This table considers proxy variables for cognitive abilities. In the left hand panel, ISCED97 levels as suggested by the UNESCO serve as proxy for cognitive abilities. Respondents in SAVE have ISCED97 levels between 2 "lower secondary education" and 5 "first stage tertiary education". The largest group of respondents (52%) have level 3 education, i.e. "upper secondary education" comprising also the group of qualified jobs. Respondents are spread relatively equally about the 3 remaining groups. Column (i) reprints the results from Table 5. Columns (ii) to (iv) include a score taking the value of the ISCED97 level. In column (v) ISCED97 levels are included as indicator variables, where level 3 ("upper secondary education") is omitted. In the right hand panel the three variables capturing cognitive reflection, (advanced) financial literacy and IQ are derived from an iterated principal factor analysis (see Appendix G. Although only partly reported, we employ the complete set of control variables as in Table 5. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	IQ proxies based on vocational training					IQ proxy based on factor analysis	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Cognitive reflection	-0.082**	-0.093***		-0.076**	-0.076**	-0.085**	-0.086***
	(0.034)	(0.032)		(0.034)	(0.034)	(0.033)	(0.033)
Financial literacy	-0.165**		-0.199***	-0.156**	-0.153*	-0.065	
	(0.079)		(0.075)	(0.078)	(0.078)	(0.042)	
adv. FL (only)							-0.087**
							(0.040)
IQ-proxy						-0.038	-0.039
						(0.035)	(0.035)
Mid-level education	0.123					0.112	0.134
	(0.090)					(0.096)	(0.097)
A-level education	0.087					0.064	0.099
	(0.099)					(0.109)	(0.112)
ISCED97		-0.051	-0.055	-0.049	[upper secondary]		
		(0.041)	(0.041)	(0.041)	[omitted]		
Lower secondary					0.056		
					(0.106)		
Postsec. non-tert.					-0.095		
					(0.110)		
Tertiary					-0.080		
					(0.105)		
2nd wealth quartile	-0.497***	-0.486***	-0.503***	-0.486***	-0.484***	-0.461***	-0.461***
	(0.107)	(0.107)	(0.106)	(0.107)	(0.107)	(0.109)	(0.109)
3rd wealth quartile	-0.384***	-0.390***	-0.403***	-0.379***	-0.378***	-0.386***	-0.381***
	(0.105)	(0.105)	(0.104)	(0.105)	(0.105)	(0.110)	(0.109)
4th wealth quartile	-0.725***	-0.732***	-0.736***	-0.713***	-0.711***	-0.714***	-0.702***
	(0.110)	(0.110)	(0.110)	(0.111)	(0.111)	(0.115)	(0.115)
Log income	-0.056	-0.056	-0.042	-0.034	-0.036	-0.045	-0.039
	(0.079)	(0.077)	(0.077)	(0.077)	(0.077)	(0.080)	(0.080)
Basic demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household structure	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
μ_1	-0.520	-0.664	-0.534	-0.576	-0.441	-0.339	-0.265
	(0.720)	(0.712)	(0.715)	(0.715)	(0.720)	(0.742)	(0.742)
μ_2	0.222	0.076	0.205	0.166	0.301	0.411	0.487
	(0.720)	(0.712)	(0.715)	(0.715)	(0.720)	(0.741)	(0.742)
μ_3	0.586	0.438	0.568	0.529	0.665	0.760	0.835
	(0.720)	(0.712)	(0.715)	(0.715)	(0.720)	(0.742)	(0.742)
N	1120	1120	1120	1120	1120	1045	1045
$pseudoR^2$	0.160	0.156	0.157	0.160	0.161	0.148	0.149

Table 10: Robustness: Bivariate probit regression of consumer installment credit usage on cognitive reflection and financial literacy

In this table we analyze how different household characteristics are related to the prevalence of consumer credit. The dependent variable is the respondents' indication on whether they have any outstanding balances on consumer credit (e.g. car loan, credit for buying clothes or electronic devices). We estimate a bivariate probit regression with partial observability according to the model by Poirier (1980), since we can only observe cases in which a person applied for credit and was granted one. In columns (i) and (ii) we report on the left hand side coefficient estimates for the variables potentially influencing customers' decision to apply for credit, whereas on the right hand side we analyze the banks' decision to grant credit. In column (ii) we include the "desire for credit", which is a dummy variable indicating whether a person has asked for credit during the last five years or whether a person did not dare to apply for credit out of fear of being refused. On the side of the bank we include the variable "bank received request" if a person has asked for credit within the last five years. We include a probit model for comparison in column (iii). Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	bivariate probit				probit
	(i)		(ii)		(iii)
	customer	bank	customer	bank	compare (ii)
CRT score	-0.001		0.002**		-0.034
	(0.021)		(0.001)		(0.048)
Financial literacy	-0.012		-0.005***		-0.156
	(0.041)		(0.002)		(0.106)
Age	0.050**	0.049**	0.044*	0.043*	0.034
	(0.023)	(0.023)	(0.025)	(0.025)	(0.026)
Age^2	-0.070***	-0.070***	-0.057**	-0.057**	-0.048*
	(0.023)	(0.023)	(0.024)	(0.024)	(0.025)
Couple	0.058		0.028		0.022
	(0.151)		(0.117)		(0.131)
Married		0.062		0.024	
		(0.087)		(0.117)	
Number of children	-0.043	-0.042	-0.049	-0.041	-0.036
	(0.052)	(0.051)	(0.056)	(0.056)	(0.057)
Log income	0.442***	0.468***	0.332***	0.352***	0.429***
	(0.143)	(0.093)	(0.101)	(0.103)	(0.120)
Rent		0.000		0.000***	0.001***
		(0.000)		(0.000)	(0.000)
Log wealth	-0.040***		-0.041***		
	(0.012)		(0.013)		
Log total assets		-0.043***		-0.042***	-0.033**
		(0.012)		(0.013)	(0.015)
Log building soc. loans		0.013		0.005***	0.031**
		(0.008)		(0.001)	(0.015)
Log mortgages		0.019**		0.010***	0.002
		(0.008)		(0.003)	(0.011)
Log educational loans		0.000		0.000**	-0.038
		(0.002)		(0.000)	(0.054)
Volume overdraft	0.002	0.002	-0.003	-0.003	0.003
	(0.010)	(0.010)	(0.011)	(0.011)	(0.012)
Self-employed	0.038	0.045	0.054	0.051	0.058
	(0.223)	(0.225)	(0.215)	(0.225)	(0.223)
Desire for credit			1.346***		1.506***
			(0.123)		(0.146)
Bank received request				1.338***	
				(0.124)	
μ	-4.768***	-4.679***	-4.932***	-4.699***	-5.360***
	(1.069)	(0.762)	(0.875)	(0.861)	(0.937)
N	1223	1223	1212	1212	1212
Pseudo R^2					0.257

Table 11: Robustness: Ordered probit regressions of overdraft usage considering potentially credit-constrained groups

This table shows ordered probit regression results when considering that credit line usage may differ for credit-constrained people without access to installment credit. Column (i) reprints the results from Table 5. In column (ii) we include two dummy variables indicating whether a household is credit-constrained objectively (i.e. was fully or partly denied credit in the past five years) or subjectively (i.e. in the past five years a household did not request credit for fear of denial). In columns (iii) and (iv) we exclude households which may be credit constrained due to their occupation or occupational status and resulting irregular income streams. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	(i)	(ii)	(iii)	(iv)
CRT score	-0.082**	-0.085**	-0.086**	-0.094***
	(0.034)	(0.035)	(0.035)	(0.035)
Financial literacy	-0.165**	-0.139*	-0.160**	-0.132*
	(0.079)	(0.080)	(0.081)	(0.080)
2nd wealth quartile	-0.497***	-0.412***	-0.445***	-0.474***
	(0.107)	(0.109)	(0.110)	(0.109)
3rd wealth quartile	-0.384***	-0.297***	-0.372***	-0.368***
	(0.105)	(0.107)	(0.110)	(0.107)
4th wealth quartile	-0.725***	-0.619***	-0.701***	-0.711***
	(0.110)	(0.112)	(0.113)	(0.113)
Log income	-0.056	-0.021	-0.095	-0.081
	(0.079)	(0.082)	(0.087)	(0.083)
Age	0.047**	0.052***	0.056***	0.054***
	(0.020)	(0.020)	(0.020)	(0.020)
Age^2	-0.067***	-0.071***	-0.073***	-0.073***
	(0.019)	(0.019)	(0.019)	(0.019)
Blue-collar worker	-0.121	-0.077	-0.088	-0.118
	(0.122)	(0.123)	(0.127)	(0.123)
Civil servant	0.057	0.087	0.066	0.063
	(0.160)	(0.159)	(0.160)	(0.160)
Self-employed	0.300	0.313	0.403*	
	(0.204)	(0.210)	(0.207)	
Retired	0.157	0.174	0.089	0.156
	(0.125)	(0.126)	(0.127)	(0.125)
Other occupation	-0.018	-0.028	-0.069	-0.049
	(0.134)	(0.136)	(0.144)	(0.135)
Unemployed	0.071	0.012		0.175
	(0.185)	(0.190)		(0.187)
Obj. constrained		0.630***		
		(0.181)		
Subj. constrained		0.900***		
		(0.208)		
Household structure	Yes	Yes	Yes	Yes
Educational controls	Yes	Yes	Yes	Yes
μ_1	-0.520	-0.031	-0.490	-0.513
	(0.720)	(0.749)	(0.755)	(0.740)
μ_2	0.222	0.744	0.270	0.232
	(0.720)	(0.749)	(0.755)	(0.740)
μ_3	0.586	1.137	0.634	0.601
	(0.720)	(0.749)	(0.755)	(0.740)
N	1120	1101	1069	1082
Pseudo R^2	0.160	0.202	0.152	0.161

Table 12: Robustness: Ordered probit regressions of overdraft usage considering a proxy for impulsiveness

In this table we replace the *CRT score* by a proxy for respondents' impulsiveness. We use childhood pocket money (PM) spending behavior as a proxy assuming that quick spending indicates impulsiveness. We include two new variables termed "spent PM quickly" and "received PM regularly". In columns (i) and (ii) the variables span values 0-10 where a value of 10 signals immediate spending and regular pocket money receipt. In columns (iii) and (iv) we define two dummy variables indicating whether the value on the agreement scale is larger than 5. We also consider financial literacy: In columns (i) and (ii) we include the number of correct answers to nine questions whereas in column (iii) and (iv) we consider a dummy which turns to one when more than the median number of questions (at least 7) are answered correctly. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	Categorial variables		Indicator variables	
	(i)	(ii)	(iii)	(iv)
Spent PM quickly	0.048***	0.053***	0.232***	0.227***
	(0.012)	(0.013)	(0.085)	(0.086)
Received PM regularly		-0.012		0.030
		(0.010)		(0.078)
Financial literacy	-0.052***	-0.052***	-0.218***	-0.221***
	(0.018)	(0.018)	(0.076)	(0.076)
2nd wealth quartile	-0.426***	-0.428***	-0.460***	-0.460***
	(0.105)	(0.105)	(0.106)	(0.106)
3rd wealth quartile	-0.360***	-0.358***	-0.385***	-0.386***
	(0.105)	(0.105)	(0.103)	(0.103)
4th wealth quartile	-0.626***	-0.626***	-0.659***	-0.659***
	(0.112)	(0.112)	(0.110)	(0.110)
Log income	-0.076	-0.069	-0.072	-0.074
	(0.078)	(0.078)	(0.079)	(0.078)
Age	0.056***	0.055***	0.052***	0.053***
	(0.020)	(0.020)	(0.020)	(0.020)
Age^2	-0.071***	-0.071***	-0.069***	-0.069***
	(0.020)	(0.020)	(0.020)	(0.020)
Gender (male)	0.002	0.005	0.025	0.023
	(0.074)	(0.074)	(0.073)	(0.074)
Couple	0.092	0.083	0.101	0.103
	(0.096)	(0.096)	(0.096)	(0.096)
Number of children	0.112***	0.109***	0.106***	0.107***
	(0.041)	(0.041)	(0.041)	(0.041)
Occupational controls	Yes	Yes	Yes	Yes
Educational controls	Yes	Yes	Yes	Yes
μ_1	-0.188	-0.225	-0.179	-0.162
	(0.736)	(0.738)	(0.737)	(0.739)
μ_2	0.585	0.548	0.590	0.607
	(0.737)	(0.739)	(0.737)	(0.739)
μ_3	0.920	0.884	0.925	0.942
	(0.738)	(0.740)	(0.738)	(0.740)
N	1107	1107	1107	1107
Pseudo R^2	0.148	0.149	0.144	0.144

Table 13: Robustness: Ordered probit regressions of overdraft usage considering alternative measurements of financial literacy

This table reports ordered probit regressions on different proxies for financial literacy which are obtained by applying an iterated principal factor analysis as in van Rooij, Lusardi, and Alessie (2011). Column (i) replicates the results from Table 7 column (ii). Column (ii) displays results when scores are analyzed instead of indicator variables. Columns (iii) and (iv) show the results for two financial literacy indices. The basic financial literacy index is obtained from an iterated principal factor analysis of the four basic financial literacy questions (in column (iv) we also include four items indicating whether a respondent admitted to not knowing an answer). The advanced financial literacy index is obtained analogically considering the five advanced financial literacy questions. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	(i) indicator variables	(ii) scores	(iii) indices for FL only correct items	(iv) indices for FL with don't know items
CRT score	-0.083**	-0.073**	-0.080**	-0.076**
	(0.034)	(0.036)	(0.035)	(0.035)
Basic financial literacy	-0.031	0.020	0.086*	0.032
	(0.074)	(0.042)	(0.049)	(0.062)
Advanced financial literacy	-0.155**	-0.057*	-0.092**	-0.083*
	(0.079)	(0.031)	(0.042)	(0.048)
2nd wealth quartile	-0.492***	-0.462***	-0.471***	-0.469***
	(0.107)	(0.109)	(0.109)	(0.109)
3rd wealth quartile	-0.374***	-0.385***	-0.397***	-0.391***
	(0.106)	(0.109)	(0.110)	(0.109)
4th wealth quartile	-0.717***	-0.705***	-0.717***	-0.713***
	(0.110)	(0.115)	(0.115)	(0.115)
Log income	-0.052	-0.051	-0.053	-0.053
	(0.079)	(0.081)	(0.082)	(0.081)
Age	0.048**	0.044**	0.045**	0.045**
	(0.020)	(0.020)	(0.020)	(0.020)
Age^2	-0.068***	-0.063***	-0.064***	-0.064***
	(0.019)	(0.019)	(0.019)	(0.019)
Other demographics	Yes	Yes	Yes	Yes
Educational controls	Yes	Yes	Yes	Yes
μ_1	-0.447	-0.467	-0.403	-0.395
	(0.724)	(0.743)	(0.746)	(0.743)
μ_2	0.294	0.281	0.347	0.353
	(0.725)	(0.743)	(0.746)	(0.743)
μ_3	0.655	0.632	0.697	0.702
	(0.725)	(0.743)	(0.746)	(0.743)
N	1118	1054	1054	1054
Pseudo R^2	0.160	0.149	0.151	0.149

Figure 2: Distribution of self-assessed math skills and financial literacy

This plot displays the distribution of respondents' ratings on their mathematical abilities and financial knowledge on a scale from 1 "very low" to 7 "very high".

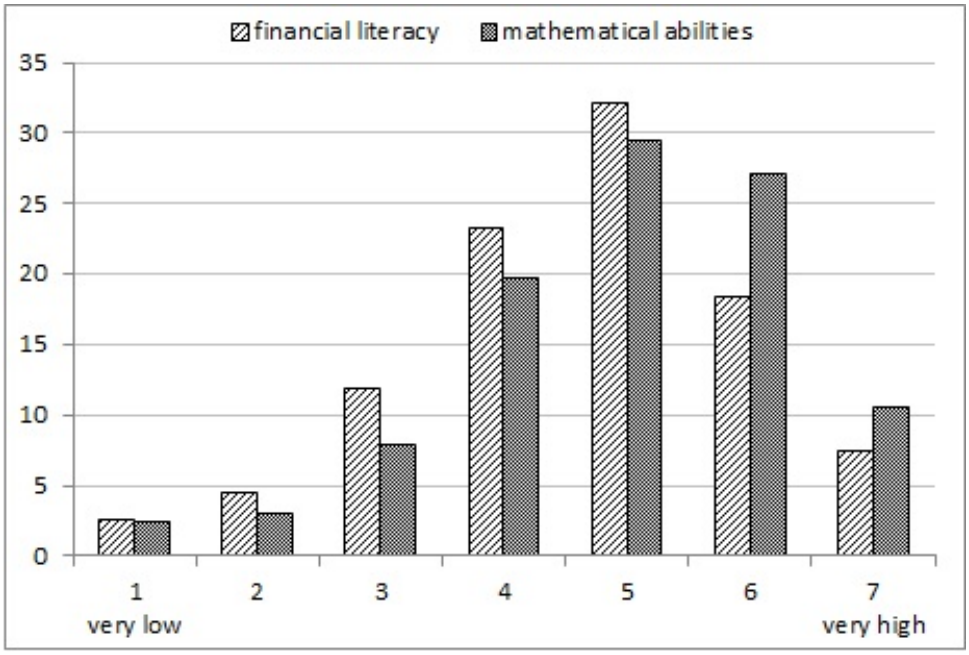

Table 14: Robustness: Correlations including self-assessments

This table shows Pearson correlations between the test based and self-assessed measures for financial literacy and numeracy. All variables are defined as scores.

	CRT	Basic FL	Adv. FL	Reported maths
Basic FL score	0.36			
Advanced FL score	0.34	0.56		
Reported math skills	0.20	0.29	0.26	
Reported FL	0.05	0.16	0.20	0.46

Table 15: Robustness: Ordered probit regressions of overdraft usage considering self-assessed measures

This table considers self-assessed measures of mathematical skill and financial knowledge. Column (i) replicates results from Table 3.2 and in columns (ii) and (iii) this results is compared to self-assessed math skills as explanatory variable. Column (iv) is reproduced from Table 5 and contrasts the test based measure of financial literacy with self-reports in columns (v) and (vi). In columns (vii) an analysis as in 7 including only test based measures is compared with a mix including self-assessed math skills instead of our math proxy obtained from the basic financial literacy questions. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	(i) CRT	(ii) Reported math skills	(iii) CRT vs. reported maths	(iv) FL test	(v) Reported FL	(vi) FL: Test vs. reported	(vii) Only tested measures	(viii) Mix with maths
CRT score	-0.094***		-0.088***				-0.080**	-0.075**
	(0.033)		(0.033)				(0.035)	(0.034)
Financial literacy				-0.207***		-0.205***		
				(0.076)		(0.076)		
Basic literacy (numeracy)							-0.020	
							(0.075)	
Advanced literacy							-0.158**	-0.164**
							(0.079)	(0.079)
Self-assessed FL					-0.020	-0.015		
					(0.030)	(0.030)		
Self-assessed maths		-0.057*	-0.048					-0.049
		(0.030)	(0.030)					(0.030)
2nd wealth quartile	-0.493***	-0.510***	-0.491***	-0.511***	-0.514***	-0.512***	-0.494***	-0.493***
	(0.107)	(0.107)	(0.108)	(0.107)	(0.107)	(0.107)	(0.108)	(0.108)
3rd wealth quartile	-0.412***	-0.448***	-0.413***	-0.426***	-0.449***	-0.426***	-0.396***	-0.399***
	(0.106)	(0.105)	(0.106)	(0.105)	(0.105)	(0.105)	(0.106)	(0.106)
4th wealth quartile	-0.743***	-0.770***	-0.738***	-0.747***	-0.772***	-0.742***	-0.720***	-0.715***
	(0.111)	(0.110)	(0.111)	(0.111)	(0.110)	(0.111)	(0.111)	(0.111)
Log income	-0.059	-0.077	-0.063	-0.044	-0.072	-0.043	-0.036	-0.040
	(0.077)	(0.077)	(0.078)	(0.077)	(0.077)	(0.077)	(0.078)	(0.078)
Age	0.045**	0.048**	0.046**	0.045**	0.047**	0.045**	0.044**	0.045**
	(0.020)	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Age^2	-0.065***	-0.067***	-0.066***	-0.065***	-0.066***	-0.065***	-0.064***	-0.066***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Economics education	-0.032	-0.024	-0.026	-0.027	-0.029	-0.025	-0.029	-0.022
	(0.022)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.022)	(0.023)
Other demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
μ_1	-0.566	-0.778	-0.771	-0.419	-0.607	-0.473	-0.434	-0.643
	(0.718)	(0.738)	(0.737)	(0.721)	(0.730)	(0.733)	(0.724)	(0.742)
μ_2	0.173	-0.042	-0.031	0.319	0.129	0.265	0.307	0.099
	(0.718)	(0.738)	(0.737)	(0.721)	(0.730)	(0.733)	(0.724)	(0.742)
μ_3	0.530	0.313	0.325	0.677	0.484	0.623	0.665	0.457
	(0.718)	(0.738)	(0.737)	(0.722)	(0.730)	(0.733)	(0.725)	(0.743)
N	1101	1101	1101	1101	1101	1101	1101	1101
Pseudo R^2	0.155	0.151	0.156	0.156	0.150	0.156	0.159	0.159

Figure 3: Distribution of self-assessed personality traits

The two plots display the distribution of respondents' self-assessed personality traits. The left hand plot shows respondents agreement (on a scale from 0 "totally disagree" to 10 "completely agree") to the statements "I only care for urgent matters, since future problems oftentimes will resolve by themselves" and "I prefer tasks with immediate and concrete results over tasks whose results materialize in the far future". The right hand plot shows where respondents align themselves between two extreme personalities described. The first extremes are easy-going versus determined. Easy-going is described as: "I live without a thought for tomorrow an take the rough with the smooth." (value of 0). Determined people are pictured as: "I think a lot about the future and know well what I want to become and do." (value of 10). The other extremes are spontaneous opposed to pensive personalities: "I decide quickly and impulsively." (value of 0) or "I need a lot of time making decisions or deriving an opinion." (value of 10).

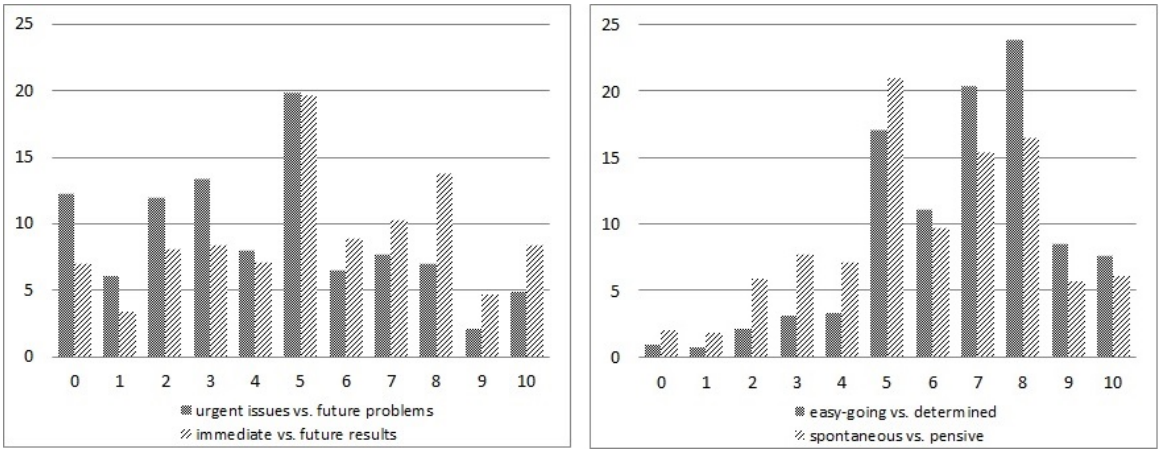

Table 16: Robustness: Considering further personality traits

This table considers further personality traits from the 2008 and 2007 survey waves of the SAVE questionnaire. Column (i) reprints the results from Table 5. In columns (ii) and (iii) two additional variables are included: For the statements [I focus on] "urgent/future problems" or "immediate/future results" respondents indicate their agreement on a scale from 0 ("totally disagree") to 10 ("completely agree"). The results are included in the regression in column (ii). Since the distribution of answers hints at a mid-category bias, we replace the values from 0 to 10 by a dummy variable in the results in column (iii), indicating whether the respondent chose a value above 5 (the mid-category). Column (iv) includes two further personality variables: "easy-going/determined" and "spontaneous/pensive" where the two terms mark the extremes of a 0 to 10 scale. Column (v) includes all variable simultaneously. Although not reported, we employ the complete set of control variables as in Table 5. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	(i)	(ii)	(iii)	(iv)	(v)
CRT score	-0.081**	-0.080**	-0.080**	-0.088**	-0.087**
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Financial literacy	-0.185**	-0.188**	-0.192**	-0.193**	-0.199**
	(0.080)	(0.080)	(0.080)	(0.079)	(0.080)
2nd wealth quartile	-0.450***	-0.454***	-0.456***	-0.431***	-0.436***
	(0.110)	(0.110)	(0.109)	(0.110)	(0.110)
3rd wealth quartile	-0.340***	-0.339***	-0.339***	-0.307***	-0.307***
	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)
4th wealth quartile	-0.675***	-0.674***	-0.671***	-0.648***	-0.644***
	(0.113)	(0.113)	(0.113)	(0.112)	(0.112)
Log income	-0.073	-0.069	-0.071	-0.082	-0.081
	(0.093)	(0.093)	(0.093)	(0.094)	(0.094)
Age	0.044**	0.044**	0.045**	0.046**	0.047**
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Age^2	-0.063***	-0.064***	-0.064***	-0.064***	-0.065***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
urgent/future problems		-0.002			
		(0.015)			
immediate/future results		0.012			
		(0.015)			
urgent/future problems dum			-0.041		-0.066
			(0.085)		(0.086)
immediate/future results dum			0.076		0.064
			(0.077)		(0.077)
easy-going/determined				-0.071***	-0.071***
				(0.021)	(0.021)
spontaneous/pensive				-0.034**	-0.034**
				(0.017)	(0.017)
Household structure	Yes	Yes	Yes	Yes	Yes
Occupational controls	Yes	Yes	Yes	Yes	Yes
Educational controls	Yes	Yes	Yes	Yes	Yes
μ_1	-0.647	-0.573	-0.613	-1.277	-1.257
	(0.784)	(0.797)	(0.789)	(0.805)	(0.810)
μ_2	0.108	0.182	0.142	-0.512	-0.492
	(0.784)	(0.797)	(0.789)	(0.805)	(0.810)
μ_3	0.461	0.535	0.495	-0.155	-0.135
	(0.784)	(0.797)	(0.789)	(0.805)	(0.809)
N	1072	1072	1072	1072	1072
$pseudoR^2$	0.151	0.152	0.152	0.168	0.169

Table 17: Robustness: Applying different regression models

This table reruns the regression from Table 5 column (iii) and Table 7 for different estimation procedures. Columns (i) and (ii) display the coefficient estimates of regressing overdraft credit usage frequency on the full set of explanatory and control variables by an OLS regression with heteroscedasticity-robust standard errors. In columns (iii) and (iv) we perform a probit regression of a dummy indicating whether the credit line has been used excessively in the preceding year (i.e. at least 6 times or constantly). Although not fully reported, we employ the complete set of control variables as in Table 5. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	OLS		Probit	
	(i)	(ii)	(iii)	(iv)
CRT score	-0.067**	-0.069**	-0.084*	-0.092**
	(0.031)	(0.031)	(0.047)	(0.047)
Financial literacy	-0.162**		-0.318***	
	(0.071)		(0.109)	
Basic literacy (numeracy)		-0.024		-0.110
		(0.066)		(0.103)
Advanced literacy		-0.148**		-0.161
		(0.069)		(0.109)
2nd wealth quartile	-0.478***	-0.477***	-0.415***	-0.408***
	(0.104)	(0.104)	(0.131)	(0.131)
3rd wealth quartile	-0.394***	-0.389***	-0.483***	-0.478***
	(0.104)	(0.104)	(0.136)	(0.136)
4th wealth quartile	-0.665***	-0.665***	-0.796***	-0.801***
	(0.103)	(0.102)	(0.155)	(0.154)
Log income	-0.025	-0.025	-0.033	-0.043
	(0.065)	(0.065)	(0.097)	(0.097)
Age	0.019	0.020	0.034	0.034
	(0.016)	(0.016)	(0.028)	(0.027)
Age^2	-0.036**	-0.037**	-0.056**	-0.056**
	(0.014)	(0.014)	(0.027)	(0.027)
Mid-level education	0.118	0.121	0.207*	0.206*
	(0.081)	(0.081)	(0.120)	(0.119)
A-level education	0.069	0.072	0.189	0.179
	(0.084)	(0.084)	(0.137)	(0.136)
Economics education	-0.027	-0.028	-0.061*	-0.065**
	(0.019)	(0.019)	(0.032)	(0.032)
Household structure	Yes	Yes	Yes	Yes
Occupational controls	Yes	Yes	Yes	Yes
α	2.720***	2.693***	-0.385	-0.327
	(0.623)	(0.624)	(0.928)	(0.921)
N	1118	1118	1118	1118
$adj./pseudoR^2$	0.147	0.145	0.133	0.128

Table 18: Robustness: Considering characteristics of the SAVE sample

This table reruns the regression from Table 5 column (iii) and Table 7. In columns (i) and (ii) we analyze whether our results are prone to an item non-response bias. For this purpose, we make use of five imputed data sets provided by MEA. While we do not rely on imputed values for our dependent and explanatory variables, we use the imputed values for the control variables. We run ordered probit regressions on all five imputed data sets. The results are obtained by using Rubin's Method (Rubin, 1987). In columns (iii) and (iv) we analyze whether our results are influenced by differences in two differing sample populations: The SAVE survey is conducted among household from a so called "access panel" and a "random sample". To control for possible differences we include a variable indicating participants from the random sample. Although not fully reported, we employ the complete set of control variables as in Table 5. Robust standard errors are given in parentheses. Significance levels are indicated as *** 1%-level, ** 5%-level, * 10%-level.

	mi oprobit		oprobit sample dum	
	(i)	(ii)	(iii)	(iv)
CRT score	-0.084***	-0.087***	-0.082**	-0.083**
	(0.032)	(0.032)	(0.034)	(0.034)
Financial literacy	-0.125*		-0.166**	
	(0.074)		(0.079)	
Basic literacy (numeracy)		0.003		-0.031
		(0.07)		(0.074)
Advanced literacy		-0.128*		-0.155**
		(0.073)		(0.079)
2nd wealth quartile	-0.443***	-0.445***	-0.491***	-0.490***
	(0.120)	(0.120)	(0.107)	(0.107)
3rd wealth quartile	-0.482***	-0.481***	-0.377***	-0.372***
	(0.115)	(0.115)	(0.106)	(0.106)
4th wealth quartile	-0.838***	-0.838***	-0.720***	-0.717***
	(0.115)	(0.115)	(0.111)	(0.110)
Log income	-0.03	-0.028	-0.056	-0.053
	(0.075)	(0.076)	(0.079)	(0.079)
Age	0.055***	0.055***	0.047**	0.048**
	(0.018)	(0.018)	(0.020)	(0.020)
Age^2	-0.071***	-0.072***	-0.067***	-0.068***
	(0.017)	(0.017)	(0.019)	(0.019)
Mid-level education	0.121	0.123	0.125	0.129
	(0.084)	(0.084)	(0.090)	(0.090)
A-level education	0.046	0.048	0.088	0.090
	(0.094)	(0.094)	(0.099)	(0.098)
Economics education	-0.024	-0.024	-0.028	-0.029
	(0.021)	(0.021)	(0.022)	(0.022)
Household structure	Yes	Yes	Yes	Yes
Occupational controls	Yes	Yes	Yes	Yes
Random sample dummy			-0.021	-0.018
			(0.071)	(0.071)
μ_1	-0.114	-0.114	-0.507	-0.472
	(0.684)	(0.684)	(0.728)	(0.730)
μ_2	0.656	0.656	0.234	0.269
	(0.684)	(0.684)	(0.728)	(0.731)
μ_3	1.007	1.007	0.595	0.630
	(0.684)	(0.684)	(0.728)	(0.731)
N	1291	1291	1118	1118
$pseudoR^2$			0.160	0.160

A Cognitive Reflection Test

This appendix provides the Cognitive Reflection Test introduced by Fredrick (2005) which is translated into German in the 2009 SAVE survey. In the questionnaire the questions of the CRT are captioned "brain teasers" and are provided in fill-in-format. We indicate correct answers in brackets.

1. A bat and a ball cost 110 cents in total. The bat costs 100 cents more than the ball. How much does the ball cost? - Price of the ball: _ _ _ cents (please fill in) [5]

2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? - Time required: _ _ _ minutes (please fill in). [5]

3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? - Duration, until lake is covered half with water lilies: _ _ _ days (please fill in). [47]

B Financial Literacy Questions

This appendix provides a translation of the questions on financial literacy in the 2009 SAVE questionnaire. Correct answers are in bold font. The first four questions displayed here refer to basic financial literacy while the latter five gauge more advanced financial concepts. The order in the SAVE survey deviates from the original questionnaire by van Rooij, Lusardi, and Alessie (2011).

Basic financial literacy questions (financial numeracy):

1. Suppose you own €100 in a savings account. This balance yields interest of 2% per year and you leave it on this account for 5 years. What do you think: What is the deposit account balance after 5 years? - **More than €102**; Exactly €102; Less than €102; Don't know.

2. Suppose you had €100 in a savings account and the interest rate is 20% per year and you leave it on this account for 5 years. What do you think: What is the deposit account balance after 5 years? - **More than €200**; Exactly €200; Less than €200; Don't know.

3. Assuming your savings account yields interest of 1% per year and inflation amounts to 2 % per year. What do you think: Will you be able to buy more, less, or as much as today with your deposit account balance after one year? - More; As much as today; **Less**; Don't know.

4. Suppose that in the year 2012 your income has doubled and prices of all goods have doubled too. How much will you be able to by with your income in 2012? - More than today; **As much as today**; Less; Don't know.

Advanced financial literacy questions:

1. Which of the following assets exhibits the highest return volatility? - Savings books, bonds, **stocks**, don't know.

2. Which is the main function of the stock market? - The stock market predicts stock earnings; results in an increase in the price of stocks; **The stock market brings people who want to buy stocks together with those who want to sell stocks**; None of the above; Don't know.

3. Is the following statement true or false: An investment in a single stock is less risky than an investment in an equity mutual fund? - True; **False**; Don't know.

4. Which of the following statements is correct? - If you invest in a balanced fund, you cannot withdraw money within the first year of your investment; **Balanced funds invest in several asset classes like stocks and bonds**; Balanced funds guarantee a fixed interest rate which is based on past performance; None of the above statements is correct; Don't know.

5. How does a fixed-coupon bond price react to decreasing interest rates? - **Bond price increases**; Bond price remains constant; Bond price decreases; Don't know.

C Sample Selection

In this appendix we illustrate how the data sample decreases due to necessary data requirements. We argue that the characteristics of households in the sample stay relatively stable or develop in a direction which would make it more difficult to find the hypothesized effects of cognitive reflection and financial literacy. We can see from the column "unrestricted N" in Panel A in the Table below, that 83% of respondents are providing information on income and we can calculate aggregate wealth for 98% of households. If we require that information on all control variables is available (column (i)) the sample size decreases to 1642 observations. We formally address this sample size reduction caused by missing control variables in Section 4.9 by conducting regression analyses of multiple imputed data. We furthermore restrict the analysis to households with access to credit lines (this condition applies to about 80 % of households, column (ii)). In addition, our analyses require that people complete the Cognitive Reflection Test and the financial literacy multiple choice test which leaves us with 1118 observations (column (iii)). Control variables show that the households which are left in our sample have slightly higher income (2250 euros compared to 1950 euros in the full sample without any restrictions), are wealthier (and since wealth is strongly associated with fewer credit line use this biases against our results), while age is rather constant. Panel B of the below Table shows the fractions of groups included in the sample. In the final sample there are more couples (which would bias against results since couples can balance their finances internally), more civil servants but fewer unemployed and fewer self-employed - i.e. we remain with more people with relatively steady income. Lastly, people in the remaining sample have a better general education which would also bias against finding results for financial literacy.

Table 19: Appendix: Summary Statistics for the Selected Sample

Panel A: Mean and median values of continuous control variables					
	full sample (no restrictions)	restriction: non-missing ... (i) controls	(ii) credit line	(iii) CRT & FL	unrestricted N
nobs	2222	1642	1295	1118	2222
log income					
avg	7.574	7.586	7.704	7.720	1856
median	7.650	7.650	7.741	7.770	
wealth					
avg	140,449	154,513	172,611	181,743	2170
median	46,000	59,100	85,003	90,000	
age					
avg	55.44	55.2	56.03	55.62	2222
median	56	55	57	56	
Panel B: Mean values of discrete and dummy control variables					
male	0.480	0.501	0.509	0.518	2222
couple	0.679	0.692	0.741	0.745	2222
num_child	0.560	0.552	0.578	0.583	2144
blue_coll	0.113	0.116	0.117	0.119	2222
civ_serv	0.037	0.039	0.042	0.045	2222
self_emp	0.041	0.037	0.034	0.034	2222
retiree	0.414	0.412	0.422	0.412	2222
other_occ	0.134	0.124	0.097	0.093	2222
unemp	0.078	0.076	0.048	0.046	2222
mid_educ	0.358	0.371	0.376	0.384	2222
A_educ	0.279	0.295	0.307	0.316	2222
econ_educ	3.246	3.250	3.256	3.280	2013

D Reflectiveness, Basic & Advanced Literacy Across Demographics

Table 20: Appendix: Reflectiveness, Basic and Advanced Literacy Across Demographics

Panel A reports the distribution of the CRT results across different levels of education, different age groups, and gender. For each demographic group we also report the mean value of the *CRT score* as well as the number of individuals in each group. Panels B and C report the same statistics for the basic and advanced financial literacy questions.

Panel A: CRT score across demographics						
	Impulsiveness					
	(low) 0	1	2	3 (high)	Mean	N
Education						
Lower secondary	12.88	25.58	32.74	28.80	1.77	559
Mid-level	19.11	30.73	27.52	22.63	1.54	654
A-level	31.78	33.09	20.26	14.87	1.18	538
Age						
21-30 years	26.09	16.52	29.57	27.83	1.59	115
31-40 years	26.24	33.03	23.53	17.19	1.32	221
41-50 years	21.05	31.08	27.07	20.80	1.47	399
51-60 years	21.68	30.64	25.72	21.97	1.48	346
61-70 years	19.45	27.12	29.32	24.11	1.58	365
71 years and older	16.39	33.11	26.89	23.61	1.58	305
Gender						
Female	24.37	32.27	25.86	17.51	1.63	877
Male	17.67	27.37	28.05	26.91	1.36	874

Panel B: Basic financial literacy (numeracy) across demographics							
	Basic financial literacy						
	(low) 0	1	2	3	4 (high)	Mean	N
Education							
Lower secondary	14.19	8.54	17.61	32.33	27.33	2.50	761
Mid-level	7.74	6.17	15.75	30.31	40.03	2.89	762
A-level	2.68	1.85	9.90	28.86	56.71	3.35	596
Age							
21-30 years	11.38	8.94	13.01	21.95	44.72	2.80	123
31-40 years	6.15	5.38	18.85	23.85	45.77	2.98	260
41-50 years	8.02	5.49	14.77	27.43	44.30	2.95	474
51-60 years	9.44	4.84	13.56	32.93	39.23	2.88	413
61-70 years	4.89	5.78	16.00	36.22	37.11	2.95	450
71 years and older	13.53	6.52	12.53	32.83	34.59	2.68	399
Gender							
Female	6.52	4.09	13.73	29.89	45.76	2.72	1092
Male	10.62	7.42	15.75	31.32	34.89	3.04	1027

Panel C: Advanced financial literacy across demographics								
	Advanced financial literacy							
	(low) 0	1	2	3	4	5 (high)	Mean	N
Education								
Lower secondary	28.75	16.81	16.25	19.03	16.25	2.92	1.86	720
Mid-level	14.59	12.43	16.08	24.19	27.84	4.86	2.53	740
A-level	4.93	7.99	13.27	22.62	38.10	13.10	3.20	588
Age								
21-30 years	18.85	17.21	14.75	16.39	30.33	2.46	2.30	122
31-40 years	10.89	10.12	15.95	23.74	30.74	8.56	2.79	257
41-50 years	13.98	10.11	15.70	23.87	30.32	6.02	2.65	465
51-60 years	17.25	11.50	15.00	22.00	29.50	4.75	2.49	400
61-70 years	12.79	12.56	15.35	24.42	25.58	9.30	2.65	430
71 years and older	27.81	17.65	14.97	17.11	16.58	5.88	1.95	374
Gender								
Female	22.82	14.39	16.86	19.60	22.54	3.79	2.16	1056
Male	10.38	10.89	13.71	24.40	31.15	9.48	2.83	992

E Overdraft Usage Frequency Across Subgroups

Table 21: Appendix: Overdraft usage frequency across subgroups

This table reports usage frequencies of overdraft lines of credit across different demographic characteristics, different levels of cognitive reflection as well as basic and advanced financial literacy.

	0 (never)	1-3 times	4-6 times	more often	N
Education					
Lower secondary	51.84	21.89	9.98	16.29	571
Mid-level	42.83	28.50	8.12	20.54	628
A-level	49.50	26.96	8.85	14.69	497
Age					
21-30 years	34.92	34.92	7.94	22.22	63
31-40 years	31.34	26.37	12.94	29.35	201
41-50 years	34.29	31.15	12.04	22.51	382
51-60 years	40.00	31.18	8.82	20.00	340
61-70 years	58.75	22.45	7.57	11.23	383
71 years and older	71.56	15.90	4.89	7.65	327
Gender					
Female	45.72	26.03	8.56	19.70	853
Male	49.94	25.62	9.37	15.07	843
Net wealth quartiles					
1 (lowest)	33.78	25.95	10.29	29.98	447
2	50.00	24.47	6.91	18.62	376
3	46.45	29.10	10.27	14.18	409
4 (highest)	60.41	24.21	8.14	7.24	442
Net household income quartiles					
1 (lowest)	46.15	25.52	6.29	22.03	286
2	50.68	20.05	8.67	20.60	369
3	45.11	27.45	11.22	16.23	419
4 (highest)	49.21	27.23	9.95	13.61	382
CRT score					
0 (highly impulsive)	41.51	26.83	9.40	22.25	436
1	50.00	24.85	7.40	17.75	338
2	50.56	24.30	10.61	14.53	358
3 (highly reflective)	54.14	25.19	9.02	11.65	266
Basic financial literacy (numeracy)					
0 (low)	45.74	19.15	8.51	26.60	94
1	51.19	20.24	11.90	16.67	84
2	41.63	27.04	7.73	23.61	233
3	48.75	26.97	6.74	17.53	519
4 (high)	48.95	26.85	10.35	13.85	715
Advanced financial literacy					
0 (low)	42.86	28.06	5.61	23.47	196
1	50.53	22.87	8.51	18.09	188
2	41.56	25.93	8.23	24.28	243
3	47.17	24.80	10.78	17.25	371
4	48.81	28.94	7.78	14.47	463
5 (high)	60.98	20.33	9.76	8.94	123

F Components of Net Wealth

Table 22: Appendix: Components considered in the calculation of net wealth

The first column reports the number of respondents who provided information on their household balance sheet in the SAVE 2009 questionnaire. We also include the shares of respondents who indicated not to have invested in the respective assets (i.e. have zero value in an asset class). Furthermore, we provide overall mean values in euros as well as averages for non-zero values. The high value of real estate assets in relation to mortgage balances may be due to households having already paid off a lot of their mortgage debts at an average age of 55 years. For the regressions, net wealth is calculated as logarithmic sum of assets minus logarithmic sum of debts. Afterwards, households are sorted into net wealth quartiles. SAVE also contains information about whether the values are reported from documents or respondents' estimates. Median values (available upon request) are similar for both reporting ways.

Assets	number of observations	share of people not invested	overall mean value (in euros)	mean value if indebted (in euros)
Liquid assets				
Savings investments	1968	36%	13,538	21,263
Shares and real estate funds	2020	76%	6,649	27,922
Bonds	2039	91%	3,333	38,614
Other money assets	2053	96%	1,160	31,743
Old age provisions				
Whole life insurance	1820	71%	7,557	26,350
Riester pension	1827	86%	411	2,891
Other private pension scheme	1918	92%	1,030	13,168
Life insurance by employer	1934	95%	1,022	19,190
Other pension scheme by employer	1842	92%	1,290	16,847
Real estate assets				
Building society investments	1976	67%	2,634	7,945
Market value of flat/house	2085	48%	109,421	208,731
Other real estate assets	2110	87%	27,855	207,686
Debts and mortgages	**number of observations**	**share of people not invested**	**overall mean value (in euro)**	**mean value if indebted (in euro)**
Building society loans	2099	89%	3,906	34,303
Mortgages	2065	78%	18,495	85,440
Consumer credit	2067	84%	1,484	9,240
Family loans	1996	98%	285	12,367
Other loans	2066	97%	1,063	31,367
Education loans	2124	99%	60	7,472

G Constructing Indices from Iterated Principal Factor Analysis

Table 23: Appendix: Indices for cognitive reflection, financial literacy, and cognitive abilities

This table reports rotated factor loadings and unique variances derived from an iterated principal factor analysis. The items from all three categories (cognitive reflection, financial literacy and cognitive abilities) are included jointly into the analysis assuming three immanent factors. The two panels show the results from different analyses: in Panel B we focus on advanced financial literacy items in order to derive a characteristic more selective from numeracy (an indicative principal component analysis led us to refrain from assuming 4 underlying factors with numeracy as potential fourth factor) whereas in Panel A we consider all financial literacy questions. Although uniqueness criteria are very high, especially for the self-reported items, we do not exclude them since we need the self-assessed variables to identify the factors and thought it incosistent to exclude other items with high but still lower uniqueness criterion under this premise.

Panel A: Considering all FL items	Factor 1 FL	Factor 2 IQ	Factor 3 CR	Uniqueness
Cognitive reflection items				
Bat+Ball intuitive	-0.0371	-0.9589	-0.1465	0.0577
Machines intuitive	0.0158	-0.2053	-0.7213	0.4373
Lily pond intuitive	-0.2831	-0.2506	-0.5799	0.5207
Bat+Ball correct	0.0646	0.9222	0.1747	0.1149
Machines correct	0.0763	0.2495	0.7496	0.3701
Lily pond correct	0.3171	0.2715	0.5980	0.4681
Self-assessed reflectivity	-0.0206	-0.0062	0.0679	0.9949
Financial literacy items				
Interest (2%)	0.4941	0.0342	0.0932	0.7460
Interest (20%)	0.4231	0.0772	0.1931	0.7778
Inflation	0.5559	0.0596	0.1439	0.6667
Money illusion	0.3866	0.0993	0.1185	0.8266
Return volatility	0.5644	0.0876	0.1622	0.6474
Stock market	0.5846	0.1135	0.0910	0.6371
Diversification	0.6075	0.0805	0.1833	0.5908
Balanced funds	0.5750	0.0723	0.0982	0.6545
Bond prices	0.2562	0.1066	0.0983	0.9133
Self-assessed FL	0.1411	0.0071	0.0393	0.9785
Cognitive abilities items				
Lower secondary educ.	-0.3145	-0.1665	-0.0333	0.8723
A-level education	0.3254	0.1978	0.0686	0.8503
Panel B: Focussing on advanced FL	Factor 1 IQ	Factor 2 adv. FL	Factor 3 CR	Uniqueness
Cognitive reflection items				
Bat+Ball intuitive	-0.9535	-0.0428	-0.1511	0.0663
Machines intuitive	-0.2046	0.0181	-0.7288	0.4266
Lily pond intuitive	-0.2456	-0.3098	-0.5759	0.5120
Bat+Ball correct	0.9279	0.0618	0.1746	0.1047
Machines correct	0.2495	0.0651	0.7563	0.3616
Lily pond correct	0.2662	0.3306	0.5902	0.4716
Self-assessed reflectivity	-0.0028	-0.0359	0.0698	0.9938
Advanced financial literacy items				
Return volatility	0.0835	0.5228	0.1698	0.6909
Stock market	0.1005	0.6056	0.0931	0.6145
Diversification	0.0670	0.6306	0.1858	0.5633
Balanced funds	0.0530	0.6275	0.0937	0.5946
Bond prices	0.0996	0.2652	0.0982	0.9101
Self-assessed FL	0.0121	0.1309	0.0411	0.9810
Cognitive abilities items				
Lower secondary educ.	-0.1606	-0.3565	-0.0267	0.8464
A-level education	0.1873	0.3519	0.0654	0.8368

Table 24: Appendix: Constructing indices for basic and advanced financial literacy

Panel A reports factor loadings and uniqueness criteria when separately analyzing 4 items indicating correct answers to the basic financial literacy questions and 5 items for correct advanced financial literacy questions. Panel B repeats the two separate analyses including dummy variables indicating when a respondent chose to admit not to know the correct answer.

Panel A: Considering only correct items		
Basic FL questions	Factor loadings	Uniqueness
1) Interest (2%)	0.7905	0.3752
2) Interest (20%)	0.6044	0.6348
3) Inflation	0.6127	0.6246
4) Money illusion	0.4408	0.8057
Advanced FL questions	Factor loadings	Uniqueness
1) Return volatility	0.6087	0.6295
2) Stock market	0.6748	0.5446
3) Diversification	0.7309	0.4659
4) Balanced funds	0.6478	0.5803
5) Bond prices	0.2712	0.9264

Panel B: Considering correct and don't know items			
Basic FL questions		Factor loadings	Uniqueness
1) Interest (2%)	correct	-0.7725	0.4033
	d.k.	0.8644	0.2528
2) Interest (20%)	correct	-0.5178	0.7319
	d.k.	0.8797	0.2262
3) Inflation	correct	-0.7394	0.4533
	d.k.	0.8116	0.3413
4) Money illusion	correct	-0.4262	0.8183
	d.k.	0.7072	0.4999
Advanced FL questions		Factor loadings	Uniqueness
1) Return volatility	correct	-0.6454	0.5834
	d.k.	0.6616	0.5623
2) Stock market	correct	-0.6611	0.5630
	d.k.	0.7682	0.4099
3) Diversification	correct	-0.7517	0.4350
	d.k.	0.8035	0.3543
4) Balanced funds	correct	-0.7046	0.5035
	d.k.	0.7295	0.4678
5) Bond prices	correct	-0.2651	0.9297
	d.k.	0.6569	0.5685