Tabea Bucher-Koenen | Andreas Hackethal | Johannes Kasinger | Christine Laudenbach

Disparities in Financial Literacy, Pension Planning, and Saving Behavior

SAFE Working Paper No. 362 | October 2022

Leibniz Institute for Financial Research SAFE
Sustainable Architecture for Finance in Europe
info@safe-frankfurt.de | www.safe-frankfurt.de

Electronic copy available at: https://ssrn.com/abstract=4260867

Disparities in financial literacy, pension planning, and saving behavior*

Tabea Bucher-Koenen† Andreas Hackethal‡ Johannes Kasinger§

Christine Laudenbach5

September 2, 2022

Financial literacy affects wealth accumulation, and pension planning plays a key role in this relationship. In a large field experiment, we employ a digital pension aggregation tool to confront a treatment group with a simplified overview of their current pension claims across all pillars of the pension system. We combine survey and administrative bank data to measure the effects on actual saving behavior. Access to the tool decreases pension uncertainty for treated individuals. Average savings increase—especially for the financially less literate. We conclude that simplification of pension information can potentially reduce disparities in pension planning and savings behavior.

JEL Classification: D14, G11, G51, G53

Keywords: saving behavior, retirement planning, digital planning tool.

---

*We are grateful for helpful comments from Rob Alessie, Alan Auerbach, Fabrizio Colella, Simon Heß, Giovanni Mastrobuoni, Emmanuel Saez, Johannes Spinnewijn and seminar participants at the UC Berkeley, University of Maastricht, the G53 network, the Research in Behavioral Finance Conference (Amsterdam), the Experimental Finance Conference (Heidelberg), the SAFE Household Finance Workshop, Goethe University Frankfurt, and ZEW Mannheim. We thank Caroline Knebel for excellent research assistance. Financial support from the Leibniz Institute for Financial Research SAFE is gratefully acknowledged.

†Contact: Tabea Bucher-Koenen, ZEW - Leibniz Centre for European Economic Research and Mannheim University, L7,1 68161 Mannheim, Germany, Email: tabea.bucher-koenen@zew.de

‡Andreas Hackethal, Goethe University Frankfurt and Leibniz Institute for Financial Research SAFE, Theodor-W.-Adorno-Platz 3, 60323 Frankfurt am Main, email: hackethal@finance.uni-frankfurt.de

§Johannes Kasinger, Goethe University Frankfurt and Leibniz Institute for Financial Research SAFE, Theodor-W.-Adorno-Platz 3, 60323 Frankfurt am Main, email: kasinger@safe-frankfurt.de

5Christine Laudenbach, Goethe University Frankfurt and Leibniz Institute for Financial Research SAFE, Theodor-W.-Adorno-Platz 3, 60323 Frankfurt am Main, email: laudenbach@safe-frankfurt.de

Electronic copy available at: https://ssrn.com/abstract=4260867

1 Introduction

Pension reforms in many countries have shifted responsibility for pension income from the state to the individual level. At the same time, the emergence of multi-pillar pension systems has increased the complexity of pension portfolios (see, e.g., Börsch-Supan et al., 2015). Both trends have increased the need for individual pension planning and the difficulty of this activity. All pension planning starts from assessing current pension claims, i.e., the total available net retirement income an individual can expect at the planned retirement date. This assessment requires households to collect and process information from different sources and on various products that potentially differ in inherent risks, returns, costs, and tax treatments. Differences between households regarding how this information can be accessed and processed may thus lead to considerable retirement planning disparities with substantial welfare implications (see, e.g., Lusardi and Mitchell, 2017, 2022). Recently, pension providers and policymakers in many countries are responding by introducing digital tools that shall support planning activities.

To test the effect of the introduction of a digital pension planning aid on pension planning and saving behavior, we conduct a large field experiment in Germany. The pension dashboard is a FinTech application owned by the university that provides users with an aggregated overview of their future pension claims across all three pension pillars—public, occupational, and private. It closely resembles pension planning platforms already launched in Sweden, the Netherlands, or the UK.[1] It does not provide participants with any new information on their pension products but rather aggregates and simplifies information, which is included in the annual pension information letters but difficult to access or even shrouded. In our study, we combine a) data from three surveys, which we conducted pre-and post-intervention among participants from a treatment and a control group, and b) monthly administrative records on individual savings, checking, and portfolio accounts and demographic variables of clients from two co-operating banks. Thus, we can causally estimate the effect of facilitated pension planning on saving behavior by

[1] Denmark (1999), Sweden (2004), Norway (2008) and the Netherlands (2011) already introduced national services; the UK and Germany are in the process of implementation (Eiopa, 2021). In 2020 Brookings proposed that the US follow suit (John et al., 2020).

Electronic copy available at: https://ssrn.com/abstract=4260867

employing a difference-in-difference design controlling for (un)observable characteristics through time and individual fixed effects. Moreover, we can estimate the heterogeneous effects of the pension dashboard on individuals with different financial literacy levels.

The German pension system still has the statutory pay-as-you-go pension at its core. Like in many other aging economies, defined benefits measured as a fraction of average labor income have continuously declined over the past decades. Schön (2020) estimates that replacement rates will decrease from 55% in 2010 to below 45% in 2030. Individuals participating in the statutory pension system (over 90% of the working-age population) who want to safeguard a higher replacement rate for themselves need to accumulate extra retirement income. Identifying, assessing, and then closing the pension gap requires financial competencies. In their recent financial competence framework for adults in the European Union, the European Commission together with the OECD International Network on Financial Literacy posit "longer-term planning and asset building" as a crucial aspect of financial well-being in retirement (European Union/OECD, 2022). Households with better financial literacy skills should thus have more accurate projections of their (positive or possibly also negative) pension gap. Therefore, we hypothesize that financially literate households will have less reason to update their pension projections and saving activities in response to the information from the pension dashboard than their less literate peers but might be using it primarily to validate their own predictions.

The experiment yields three main results. First, we document that access to the dashboard reduces users' self-reported uncertainty about their retirement income. Second, the average participant increases the financial holdings at the bank in response to the treatment. This effect is stronger for active savers. Third, the treatment effect on savings is almost entirely driven by participants with low financial literacy. The results hold across different wealth measures and seem to not be driven by selection behavior in our subject pool: findings are qualitatively robust when we instrument treatment by treatment assignment.[2]

[2]Attrition arises because participants are required to provide the relevant pension documents to compose the dashboard. This process required effort because individuals had to find, scan, and upload all respective pension documents.

Electronic copy available at: https://ssrn.com/abstract=4260867

The academic literature already provides evidence for strong causal links between financial literacy, pension planning, and wealth accumulation (e.g., Lusardi and Mitchell, 2008, 2014). One strand of this literature specifically examines how the provision of individual pension information affects saving and investment decisions (Beshears et al., 2015; Chan and Stevens, 2008; Duflo and Saez, 2003; Liebman and Luttmer, 2015). The studies that are most closely related to our paper analyze the link between individual pension projections and retirement saving behavior (Dolls et al., 2018; Goda et al., 2014; Mastrobuoni, 2011). These studies provide strong evidence for a positive effect of these projections on pension literacy but only modest effects on saving adaptions. We contribute to this literature by uncovering substantial and heterogeneous effects on saving behavior. Treatment effects depend on ex-ante financial literacy, bridging the extensive literature on financial literacy (e.g., Lusardi and Mitchell, 2014, for a review) to studies about the effects of different financial education interventions on pension planning (for a meta-analysis, see Kaiser et al., 2022). Our data cover a wide range of pension products, contributing to a better understanding of the effects of retirement income information in pension systems where many households own multiple pension products.

Further, our paper contributes to recent research on the impact of digital technology on financial decision-making (see, e.g., Carlin et al., 2020; D'Acunto et al., 2019; Kalda et al., 2022). Adding to this literature, we provide evidence that simplifying access and processing pension information by a digital FinTech application can make individual retirement planning more effective, particularly for persons with lower financial literacy. Overall, we conclude that digital aids in the form of pension dashboards can facilitate pension planning for individuals, promote long-term retirement savings, and potentially help mitigate retirement planning disparities.

Electronic copy available at: https://ssrn.com/abstract=4260867

2 Design and Data

2.1 Institutional Background

In Germany, as in many other countries, recent pension reforms have contributed to a shift in responsibility for a sufficient retirement income from the state to the individual level. Individuals are increasingly responsible for retirement planning and saving. The fraction of households without supplementary private or occupational retirement savings has decreased from over 70% to less than 40% of the population (Börsch-Supan et al., 2015). Thus, the majority of households expect retirement income from different contracts. Pension providers must send annual statements to their clients informing them about the state of their pension savings. However, these statements are not standardized and, in many cases, unintelligible and full of small print. Overall, only 25% of German households state that they have ever thought about how much they need to save for their retirement and made a plan (Bucher-Koenen and Lusardi, 2011).

2.2 Experimental Design

Experimental Flow Participants are recruited with the help of two large German banks with branches all over Germany. These banks invited their clients to participate in the experiment on their website after clients logged out from their online bank accounts; all individuals in our sample maintain a checking account with the respective institution. The invitation to participate in an academic study on pension planning was posted online from mid-January to mid-February 2017.[3] Participants who clicked on the link were asked to complete a questionnaire (*Survey I*). The survey covered questions on retirement planning and saving behavior, self-perceived pension overview, financial literacy, and demographics. We used a between-subject design. Participants assigned to the treatment group were encouraged to register for the pension dashboard and upload all available

[3]The banks did not post the invitation for the entire day throughout the recruitment period since the log-out page is a very important placement for marketing campaigns.

Electronic copy available at: https://ssrn.com/abstract=4260867

pension documents to the dashboard platform.[4] The university team manually entered the documents' relevant data points into the back end of the tool.[5] From these data points, aggregate pension claims for each user are calculated and presented in a personal pension dashboard. Once the calculations were complete, an email with information that the dashboard is ready was sent out. The timing of the access to the dashboard varied across participants because some participants did not upload all documents immediately after registering. In addition, the back-office team had to contact participants in some cases because some documents were incomplete. Immediately following the presentation of the pension dashboard, the treatment group was invited to assess the content and comprehensibility of the dashboard service (*Survey II*). About one year after the start of the experiment, participants in both the treatment and control groups were re-contacted via email to complete a follow-up survey (*Survey III*) about their self-perceived pension overview and current savings behavior. In sum, the *treatment group* was invited to three surveys and received a personalized dashboard. The *control group* received two survey invitations without access to the dashboard.

Treatment - The Pension Dashboard Five to ten days after uploading their pension documents, users in the treatment group were notified by email that their dashboard is ready. Participants received an app-based aggregated overview of their potential future pension claims from all pension contracts that were uploaded. This encompasses the pensions from the public pension system and from—potentially multiple—occupational and private pension contracts. We co-operated with an established German FinTech company that offers online insurance management and created a new system owned by the university. The system runs on all devices, such as smartphones, tablets, and computers. Figure 1 shows an example dashboard. The dashboard provides participants with information on guaranteed pensions and potential additional payments depending on the type of contract. All information is expressed in terms of monthly payments at an individual's

[4] Users could photograph hard copies of their pension records, upload electronic versions, or send hard copies via postal mail.

[5] In cases where documents were incomplete, the back-office team provided support via phone or mail to resolve issues.

Electronic copy available at: https://ssrn.com/abstract=4260867

statutory retirement age. Most of the numbers are taken directly from the annual statements by pension providers and then aggregated. Where payments are stated annually, they are changed to monthly payments. If a lump sum will be paid out, we convert it to a price-adjusted lifetime annuity.[6]

The dashboard provides a simplified and standardized aggregation of information already available to the individual. Finding relevant pieces of information in unintelligible pension contracts requires substantial effort for most individuals. For trained individuals in our back office, it took about 24 minutes on average to compile one dashboard. On average, participants uploaded 4.5 different pension documents. The average expected total gross retirement income is 3,287 euros with a standard deviation of 1,985 euros (for further details on the pension documents data, see Appendix A.3). Next to the effect of simplified pension information, there might be a salience effect that stems from subjects' search for the relevant pension documents. We cannot separate these effects and thus the estimated treatment effect contains both.

2.3 Data and Participants

Data Sources Our data set comprises information from up to three surveys, the uploaded pension documents, and administrative data from the two co-operating banks (e.g., monthly account balances and several demographic variables). Survey data and administrative data can be linked via pseudonymized IDs.[7] In addition, we obtained administrative data on a group of randomly selected bank clients who hold a checking account with the banks but did not participate in the experiment (*zero touch group*).

[6]Suppose pension payments of occupational or private contracts start only after the statutory pension age. In that case, we do not display those pensions but include a note that an additional pension would start payment at a later point in time.

[7]Data confidentiality and security are ensured at all times and governed through various contractual arrangements and privacy agreements. The banks only get access to aggregate information from the dashboards and surveys but not to individual client data, except if clients want to share them with their bank explicitly.

Electronic copy available at: https://ssrn.com/abstract=4260867

Participants Our baseline sample consists of 747 individuals for whom all data sources can be linked. Initially, 14,267 clients answered Survey I—2,133 in the control group and 12,134 in the treatment group. The link changed daily and assigned participants to treatment and control groups. The treatment days are over-sampled, as we anticipated a high attrition rate later in the process due to the complexity of the task. Out of the 12,134 in the treatment group, 1,061 participants gave us all the required information to calculate their individual pension dashboards. The experiment was targeted at individuals between the age of 30 and 60. For the scope of our analysis, we restrict the sample to participants between 29 and 61 years of age. 2,894 subjects finished the experiment by filling out the final online survey—1,009 participated in the treatment group and 1,885 in the control group. To come up with the final sample, we match these clients to the administrative bank data. The matching rate is 41.63% for the treatment group and 17.35% for the control group.[8] We end up with a total sample of 747 individuals—327 in the control group and 420 in the treatment group.[9]

Summary statistics for the full sample, as well as for the treatment and the control groups separately, and the balance checks are provided in Table 1.[10] Treated participants are on average 46 years old, 31% are female, and 77% hold a high school diploma. A comparison to the control group is presented in Column (4) and reveals small differences. The treatment group is older, and respondents are slightly less likely to hold a savings account. Furthermore, participants in the treatment group produce more correct answers on the financial literacy test. The differences between the treatment and control groups are likely related to the non-random self-selection of the treatment group due to the complex task of uploading the pension documents. In our empirical estimation, we will include individual fixed effects such that observed and unobserved differences between

[8]Banks only matched the administrative data if there was a complete match possible concerning name, gender, address, and birth date. No administrative data was provided if there was a typo or missing information. Since participants in the treatment group provided their personal information digitally, the matching rate is higher for this group.

[9]We use data from the survey, available for individuals with and without matched bank records. We do not find evidence for systematic selection based on the matching probability (see Appendix B for details). Controlling for the respective bank, none of the variables used in this paper has predictive power (on the 10%-level) for whether or not an individual could be matched.

[10]A list of all variables and their description are provided in Appendix A.1.

Electronic copy available at: https://ssrn.com/abstract=4260867

treatment and control groups are controlled for. Additionally, we have information on all individuals who filled in the first survey but did not complete the treatment—the assigned-to-treatment group shown in Column (7). We will estimate the intention-to-treat effects in our robustness checks. In Column (5) of Table 1, we report information on the zero touch group. Comparing this group with our full sample (Column (6)) reveals that there are more men and (active) savers among the participants in the experiment, but they have lower saving amounts compared to the average bank client. Clients in both groups hold similar amounts of wealth prior to the experiment. These differences across groups need to be discussed under the lens of external validity, but they do not impact the estimation of a causal treatment effect.

Variables Individuals' *subjective pension overview* is measured by their agreement with the statement 'I have a good overview of my accumulated pension entitlements today'—evaluated on a 7-point Likert scale in Surveys I and III.

The dependent variables are the overall *wealth* held at the bank and the *monthly savings account balance* that are both taken from the administrative bank records. While savings balances do not capture all retirement savings titles, we are confident that they capture a substantial part of the private retirement savings of our participants. Savings accounts are by far the most popular savings vehicle in Germany (according to Deutsche Bundesbank (2019), 70% of all households own at least one savings account). Adjustments in savings balances are a simple and convenient way of adjusting retirement savings as these accounts are available to many of our subjects and do not require signing an additional contract. Moreover, large and irregular changes in savings balances can be quite safely attributed to account in- and outflows, as the rate of return is not volatile and does not depend on the composition of assets. We also look at changes in overall wealth held at the bank as an outcome variable. Overall wealth is equal to the sum of balances on savings, checking, and securities accounts. We also calculate net wealth by subtracting any outstanding credit from the bank. However, most credit is related to mortgage loans, and we do not have information on housing wealth for all individuals. Thus, the net wealth

Electronic copy available at: https://ssrn.com/abstract=4260867

variable is relatively small. On average, participants hold 22,932 euros of overall financial wealth with their sample bank in the first month of our observation period, 21,295 euros in the control group, and 24,207 euros in the treatment group. The difference is not statistically significant. In Appendix Figure A1, Panel B, we display the raw wealth for the different participant groups over all available months.

The bank data covers monthly account balances over 20 months—12 months before and up to 8 months after the start of the experiment. About 60% of the respondents own a savings account at the bank in question prior to the experiment. The average monthly savings account balance in the first observed month is equal to 3,022 euros for the full sample. We define active savings accounts as accounts with any inflows or outflows over the twelve months prior to the intervention.[11] We find that 54% of all respondents have an active savings account, which means that some 90% of savings account holders qualify as *active* holders. While the probability of owning a savings account is slightly higher in the control compared to the treatment group (64 % vs. 57%), there are no significant differences in the fraction of individuals with active savings accounts (57% vs. 51%) and no significant differences in the savings balances at the start of the time series (2,739 euros in the control and 3,243 euros in the treatment group). In Appendix Figure A1, Panel A, we display the raw savings balances for the different participant groups over all available months.

We are specifically interested in any treatment effect heterogeneity by *financial literacy*. In Survey I, we measure financial literacy based on the Big Three financial literacy questions commonly used in the literature (see Lusardi and Mitchell, 2014). The questions capture the basic understanding of interest, inflation, and risk diversification. We add a fourth question on compound interest, which plays an important role in the context of retirement savings (see, e.g., Goda et al., 2014). Overall, respondents answer on average 3.27 out of 4 financial literacy questions correctly.[12] 82.3% of the respondents answer the Big Three financial literacy questions correctly, and 38.7% answer all four financial

[11]Defined as a non zero standard deviation of the savings account balance in the twelve months prior to the intervention.

[12]The exact wording and further descriptive results on the financial literacy variables are reported in Appendix A.1.

Electronic copy available at: https://ssrn.com/abstract=4260867

literacy questions correctly.[13] For the heterogeneity analyses, we split our sample into respondents who answer all four financial literacy questions correctly (high financial literacy group) and all other participants (low financial literacy group). In a robustness check, we also use a measure for self-perceived financial literacy to split the sample. Subjects who rate themselves five or higher (four or lower) on a 7-point Likert scale are classified as having high (low) subjective financial literacy.

3 Empirical Framework

3.1 Empirical Strategy

In the first step, we examine the effect of access to the pension dashboard on the subjective pension overview. We estimate a differences-in-differences model, i.e., comparing the subjective pension overview between the treatment and control groups before and after participating in the dashboard.

We proceed by analyzing if and how the presentation of the information in the pension dashboard changes individuals' financial behavior. We define the months t relative to the start of our intervention ($t = 0$). In $t = 4$ at the latest, all subjects have access to their pension dashboard. We start by estimating a differences-in-differences model and compare average monthly savings balances and total wealth between the year before ($t \in [-12, -1]$) and the months after the experiment ($t \geq 4$). Note that in this analysis, we exclude all months in which our experiment was conducted ($t = 0, 1, 2, 3$).[14] We estimate the following model:

$$Y_{i,t} = \alpha_i + \lambda_t + \beta_{treat} treatment_{i,t} + \epsilon_{i,t}, \tag{1}$$

[13] For the Big Three questions, we can compare the financial literacy levels of the sample participants to a representative sample of the German population (see Bucher-Koenen and Knebel, 2021). This comparison reveals a comparably high financial literacy level in our sample, which we will discuss in Section 5.

[14] The exclusion of these time periods avoids biases that might arise in standard two-way fixed effect diff-in-diff models with heterogeneous treatment timing (see, e.g. Borusyak et al., 2022; Goodman-Bacon, 2021; Sun and Abraham, 2021).

Electronic copy available at: https://ssrn.com/abstract=4260867

where $Y_{i,t}$ are different measures of wealth of individual i in period t. The treatment indicator equals one if individual i is in the treatment group and $t \geq 4$. We control for individual (α_i) and time fixed effects (λ_t), accounting for potential time trends and all differences in time-invariant individual characteristics. $epsilon_{i,t}$ is the error term.[15]

Second, we estimate a dynamic differences-in-differences model in order to check how the savings and wealth balances change over time:

$$Y_{i,t} = \alpha_i + \lambda_t + \sum_{t=-12}^{7} \theta_t D_t P_i + \sum_{t=-12}^{7} \beta_t D_t T_i + \epsilon_{i,t}, \tag{2}$$

where $Y_{i,t}$ is identical to Eq. 1 above. D_t is an indicator for the t time periods relative to the start of our intervention. In contrast to Eq. 1, we include all time periods. The timing of the access to the pension dashboard varies across individuals, depending on when individuals provided the relevant information and how long it took to finish the calculations. We define treatment start as the month of the first survey, which is homogeneous across individuals. The estimated treatment effects during intervention months are thus likely downward biased as it is a weighted average between "treated" and "yet-to-be-treated" individuals. P_i is a dummy variable that equals one if individual i is in the treatment or the control group as opposed to the zero touch group. T_i is a dummy variable that equals one if individual i is in the treatment group. $\epsilon_{i,t}$ is the error term.

The β_t coefficients are the main parameters of interest and identify the per period treatment effects relative to the month before the first survey ($t = -1$). Positive β_t values indicate that individuals in the treatment group have higher savings or overall wealth balances than members of the control group in the respective month after controlling for individual and time-fixed effects (relative to the month prior to our first survey). For the months before our intervention ($t < 0$), β_t coefficients that are statistically different from zero would imply differences in savings or wealth balances between treatment and control groups before our intervention. These parameters can be used to test the parallel trends

[15] We use cluster-robust Huber/White standard errors, clustered at the individual level in all specifications. Individuals in the zero touch group are not considered when estimating the average treatment effects (Eq. 1).

Electronic copy available at: https://ssrn.com/abstract=4260867

assumption. Including the additional dummy variable P_i in our specification allows us to interpret the β_t coefficients as per period treatment effects and to incorporate information about the zero touch group captured in the time-fixed effects.

3.2 Identification

The biggest threat to identification is self-selection into treatment due to non-random attrition of the participants assigned to treatment. The differences-in-differences setup with two-way fixed effects explained above addresses any selection on time-invariant characteristics that might bias our results. The identifying assumption in this setup is the parallel trends assumption. We examine average monthly balances in the year prior to our intervention (see Figure A1 for a graphical illustration). We find no significant differences between the control and the treatment groups. This also holds for the sub-samples of low and high financial literacy. Moreover, estimated pre-treatment coefficients, β_t $(t < 0)$, are statistically insignificant in all (sub)groups.

Further, we estimate the per period intention-to-treat (ITT) effects. We use the same specification as above with the difference that in the ITT estimations, the dummy P_i equals one if an individual has been assigned to the treatment or to the control group, and T_i is a dummy variable that equals one if individual i has been assigned to the treatment group. These results can be interpreted as the causal effect of a treatment offer (reduced form effects), and they are robust to selective compliance behavior. However, compared to the actual treatment effect of the pension dashboard on the treated, effects are expected to be very small due to the large attrition in our experiment. To account for the small fraction of compliers, we also estimate a treatment-on-the-treated (TOT) effect by scaling the ITT effect as suggested by Angrist and Pischke (2008). This is equivalent to estimating a two-stage instrumental variable regression using treatment assignment as an instrument for treatment.

Another limitation is that we only observe assets held at the participants' main bank. Thus, we might underestimate the effect of the intervention because of potential account

Electronic copy available at: https://ssrn.com/abstract=4260867

activities at other institutions. In this sense, our estimates can be considered conservative.Additionally, we estimate all specifications for a sample of active savers. These savers are the most likely to adjust their savings balance with the banks that we observe because they have actively used these accounts before the intervention.

4 Results

4.1 Changes in Subjective Pension Overview

We start by examining whether participants in the treatment group updated their beliefs about expected retirement income in response to the treatment (manipulation check). We compare within-subject differences in their *subjective pension overview* before and after the intervention in the treatment and the control groups. For a graphical representation, we calculate the share of participants rating their overview as worse, unaltered, or better after the treatment (Figure 2).[16] In numbers, treated individuals increased their answer to the question by about 0.8824 points on average, corresponding to a relative increase of more than 20%, while the change of subjects in the control group is -0.0943 points. The difference-in-difference between treatment and control groups (0.98) is statistically significantly different from zero (p-value < 0.0001). In line, participants provide positive feedback on the value of the dashboard: 74.90% of participants in the treatment group indicated in Survey II, after looking at their dashboard, that the pension dashboard is very helpful for their retirement planning (Mean: 4.54, Std.Dev: 1.68). Thus, overall, the treatment successfully manipulated how informed individuals feel about their potential future pensions.

4.2 Changes in Saving Behavior

Average Savings Next, we test whether average saving adaptions differ between the treatment and the control groups as specified in Eq. 1. We find that the change in the

[16] Note that we include all subjects that filled out the first and the third surveys here, which implies that we also consider some individuals that are not included in the bank administrative data set.

Electronic copy available at: https://ssrn.com/abstract=4260867

average monthly savings balance between the year before and at least four months after the experiment is about 1,127 euros higher for treated individuals compared to the control group (see Table 2, Panel A). This difference is statistically insignificant but economically noticeable, given the average savings balance in the full sample of 3,022 euros in $t = -12$ (see Table 1). We split the sample by financial literacy level in Panels B and C of Table 2. In the low financial literacy group, the average savings balance increases by 3,354 euros more compared to the control group (significant at the 5%-level). In contrast, the difference in average savings in the high literacy group is statistically insignificant and negative, i.e., individuals are on average reducing their savings balance by 2,265 euros compared to the control group.

The patterns in saving adaptions are very similar for other financial holdings with the bank. There is a significant and positive effect on the overall wealth level, the net wealth, and the balances on savings and portfolio accounts jointly, particularly among those with lower financial literacy levels. The change in net wealth can be higher than the change in gross wealth if individuals use the repayment of outstanding credit to build wealth, which seems to be the case. Among the high financial literacy group, the respective balances decrease insignificantly for all wealth measures.

Columns (5) and (6) of Table 2 focus on active savers. Compared to all clients, the adaptions in saving behavior are stronger—as expected. The difference in average saving adaptions between the treatment and control group is 2,444 euros but remains statistically insignificant. Again, the average treatment effect increases to 5,019 euros and becomes statistically significant at the 5%-level for the sub-sample with a low financial literacy score. The savings balance among the active savers with high financial literacy decreases by 1,924 euros. Overall wealth levels among the sample of active savers also increase (significant at the 10%-level)—an effect which is once more driven by the sub-sample of low financial literacy respondents (see Panel B).

Dynamic Treatment Effects Next, we estimate per period treatment effects according to Eq. 2. We show results graphically in Figure 3 for the full sample and the sub-

Electronic copy available at: https://ssrn.com/abstract=4260867

samples split by financial literacy levels. The estimated coefficients are plotted for each period. Stars indicate significance levels with respect to the change in the savings balance compared to the last period before the intervention $t = -1$.[17]

First, the pre-period coefficients are not statistically significantly different from zero, providing strong support for the validity of the parallel trends assumption. This holds true for the full sample and all sub-samples.[18]

Second, in the full sample of all bank clients (Panel A), we observe an increase in savings balances after the intervention in the treatment group as compared to the control group (significant at the 10%-level in $t = 1$ and at the 5%-level in $t = 5$). In the sample of active savers (Panel B), the treatment effects roughly double in size, reaching values between 1,930 and 3,056 euros; these changes are statistically significant in all periods except $t = 4$. Considering that the average savings balance for the sample of active savers was equal to around 6,000 euros before the intervention, these are economically sizeable adaptions.

Third, while the β_t coefficients for the sub-samples with high financial literacy are negative and statistically insignificant for all periods, the per period treatment effects in the sub-samples with low literacy are positive and highly significant—both economically and statistically. We find the largest effects for the periods in which all subjects have access to their individual pension dashboard ($k = 4, 5, 6, 7$), ranging from 2,967 to 3,754 euros. If we concentrate on active savers only, the coefficients increase up to around 5,700 euros and the effects are statistically significant for all periods except the first two. The heterogeneity between the low and high financial literacy groups persists. Yet, the difference in effects between the full sample and the sample of low financial literacy decreases in relative terms.

The results and overall patterns are very similar when we use wealth, net wealth, or the sum of savings and investments as dependent variables (see Appendix D.1). This also points to the fact that the differences in savings adaptions are indeed driven by the

[17] Full regression results are reported in Appendix Table A8.

[18] The only exception is the β_{-2} coefficient in the sub-sample of low financial literacy (for all clients and active savers), which is statistically significant at the 10%-level.

Electronic copy available at: https://ssrn.com/abstract=4260867

fact that the treatment information is more valuable to low literacy than to high literacy clients and not driven by a higher propensity of low literacy clients to use savings balances as their preferred saving device.

Robustness These overall effects are also robust to using subjective instead of test based financial literacy (see Appendix D.2). Moreover, we tested if our results might be driven by outliers and used winsorization and trimming along different levels to exclude extreme values. The overall patterns of our results remain unchanged (see Appendix D.3).

Intention-to-treat Analysis As an additional corroboration that our findings are not driven by non-random attrition, we estimate ITT effects based on the assignment to the treatment group. We present and discuss reduced-form effects (ITT) as well as estimation results from an instrumental variable regression using the treatment assignment as an instrument for treatment uptake (TOT) in Appendix C. As expected, the ITT effects are substantially smaller than the treatment effects. However, we still find significant and positive savings adaptions in some periods after our intervention in the sub-sample of low financial literacy and among active savers. The TOT estimates after treatment become even larger than the treatment effects, particularly in the periods after the full introduction of the treatment ($t = 5, 6, 7$). However, the effects turn out less significant due to considerable attrition. The differences in savings adaptions between the low and high financial literacy sub-samples persist.

5 Discussion and Conclusions

We test how the introduction of a digital pension dashboard that provides users with an overview of their total pension claims affects saving behavior. Access to the dashboard decreases uncertainty about future pension income and significantly increases savings and wealth. This effect is particularly strong among individuals with ex-ante lower levels of financial literacy. This is a promising result of the potential effect of past and current policy initiatives to introduce national pension dashboard platforms. These dashboards

Electronic copy available at: https://ssrn.com/abstract=4260867

aid individuals—and in particular those with lower levels of financial literacy—in their pension planning and saving activities and have the potential to narrow gaps in future pension income.

Nevertheless, reaching all households, particularly those with limited financial skills and interest in pension planning, poses a challenge for pension dashboard suppliers. In our study, we have seen the challenge of motivating participants to actively self-select into the 'treatment' given the considerable effort required to upload related pension documents. In order to motivate people to use digital pension planning tools, more effort should be invested into automatically linking existing accounts to reduce the number of drop-outs and increasing overall added value for planners.

We observe considerable selection into general participation. Compared to the overall group of invited clients of the two cooperating banks, the majority of participants in the field experiment (both in the treatment and the control groups) are male with comparable high wealth, several alternative pension products, high expected pensions, and high financial literacy. While this does not harm the identification of a causal treatment effect, it might limit external validity. Even more importantly, it points to the particular challenge of motivating hard-to-reach individuals who might have a high potential benefit from using planning aids and other tools to improve their financial decisions. Recent studies have provided some evidence. Bauer et al. (2021) document that financial incentives may be an effective tool to increase look-up rates of pension information. However, the authors also show that this increased attention is not accompanied by an increase in pension knowledge or higher savings rates. Our pension dashboard complements this finding by showing an effective way of informing consumers once they are attentive. Future research should extend the existing studies on attention to information, and especially the heterogeneity in response rates, to different invitation or incentive formats

Electronic copy available at: https://ssrn.com/abstract=4260867

References

Angrist, Joshua D and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2008.

Bauer, Rob, Inka Eberhardt, and Paul Smeets, "A Fistful of Dollars - Financial Incentives, Peer Information and Retirement Savings," *Review of Financial Studies*, August 2021.

Beshears, John, James J Choi, David Laibson, Brigitte C Madrian, and Katherine L Milkman, "The effect of providing peer information on retirement savings decisions," *The Journal of Finance*, 2015, *70* (3), 1161–1201.

Börsch-Supan, Axel, Tabea Bucher-Koenen, Michela Coppola, and Bettina Lamla, "Savings in times of demographic change: Lessons from the German experience," *Journal of Economic Surveys*, 2015, *29* (4), 807–829.

Borusyak, Kirill, Xavier Jaravel, and Jann Spiess, "Revisiting event study designs: Robust and efficient estimation," *arXiv preprint arXiv:2108.12419*, 2022.

Bucher-Koenen, Tabea and Annamaria Lusardi, "Financial literacy and retirement planning in Germany," *Journal of Pension Economics & Finance*, 2011, *10* (4), 565–584.

_ **and Caroline Knebel**, "Finanzwissen und Finanzbildung in Deutschland: Was wissen wir eigentlich?," *Vierteljahrshefte zur Wirtschaftsforschung*, 2021, (01-2021), 11—-32.

Carlin, Bruce I, Arna Olafsson, and Michaela Pagel, "Mobile Apps and Financial Decision Making," *Review of Finance forthcoming*, 2020.

Chan, Sewin and Ann Huff Stevens, "What you don't know can't help you: Pension knowledge and retirement decision-making," *The Review of Economics and Statistics*, 2008, *90* (2), 253–266.

D'Acunto, Francesco, Nagpurnanand Prabhala, and Alberto G. Rossi, "The Promises and Pitfalls of Robo-advising," *Review of Financial Studies*, 2019, *32* (5), 1983–2020.

Deutsche Bundesbank, "Vermögen und Finanzen privater Haushalte in Deutschland: Ergebnisse der Vermögensbefragung 2017," *Deutsche Bundesbank Monatsbericht*, 2019, *April.*

Dolls, Mathias, Philipp Doerrenberg, Andreas Peichl, and Holger Stichnoth, "Do retirement savings increase in response to information about retirement and expected pensions?," *Journal of Public Economics*, 2018, *158*, 168–179.

Duflo, Esther and Emmanuel Saez, "The role of information and social interactions in retirement plan decisions: Evidence from a randomized experiment," *The Quarterly Journal of Economics*, 2003, *118* (3), 815–842.

Eiopa, "Technical Advice on the Development of Pension Tracking Systems," *Eiopa Advice*, 2021, *EIOPA-BoS-21-535.*

European Union/OECD, "Financial competence framework for adults in the European Union," 2022.

Electronic copy available at: https://ssrn.com/abstract=4260867

Goda, Gopi Shah, Colleen Flaherty Manchester, and Aaron J Sojourner, "What will my account really be worth? Experimental evidence on how retirement income projections affect saving," *Journal of Public Economics*, 2014, *119*, 80–92.

Goodman-Bacon, Andrew, "Difference-in-differences with variation in treatment timing," *Journal of Econometrics*, 2021, *225* (2), 254–277.

John, David C., Grace Enda, William G. Gale, and J. Mark Iwry, "Creating a Retirement Dashboard for the United States," *Brookings Policy Brief*, 2020, *October 2020.*

Kaiser, Tim, Annamaria Lusardi, Lukas Menkhoff, and Carly Urban, "Financial Education Affects Financial Knowledge and Downstream Behaviors," *Journal of Financial Economics*, 2022, *145* (2 part A), 255–272.

Kalda, Ankit, Benjamin Loos, Allessandro Previtero, and Andreas Hackethal, "Smart(Phone) Investing? A within Investor-Time Analysis of New Technologies and Trading Behavior," *Working Paper*, 2022.

Liebman, Jeffrey B and Erzo FP Luttmer, "Would people behave differently if they better understood social security? Evidence from a field experiment," *American Economic Journal: Economic Policy*, 2015, *7* (1), 275–99.

Lusardi, Annamaria and Olivia S Mitchell, "Planning and financial literacy: How do women fare?," *American Economic Review*, 2008, *98* (2), 413–17.

_ **and** _ , "The Economic Importance of Financial Literacy: Theory and Evidence," *Journal of Economic Literature*, 2014, *52* (1), 5–44.

_ **and Olivia S. Mitchell**, "How Ordinary Consumers Make Complex Economic Decisions: Financial Literacy and Retirement Readiness," *Quarterly Journal of Finance*, 2017, *7* (3), 1–31.

_ **and Olivia S Mitchell**, "Financial Literacy and Financial Behavior at Older Ages," *Wharton Pension Research Council Working Papers*, 2022, *719.*

Mastrobuoni, Giovanni, "The role of information for retirement behavior: Evidence based on the stepwise introduction of the Social Security Statement," *Journal of Public Economics*, 2011, *95* (7-8), 913–925.

Schön, Matthias, "Long-term outlook for the German statutory pension system," *Deutsche Bundesbank Discussion Paper*, 2020, (22/2020).

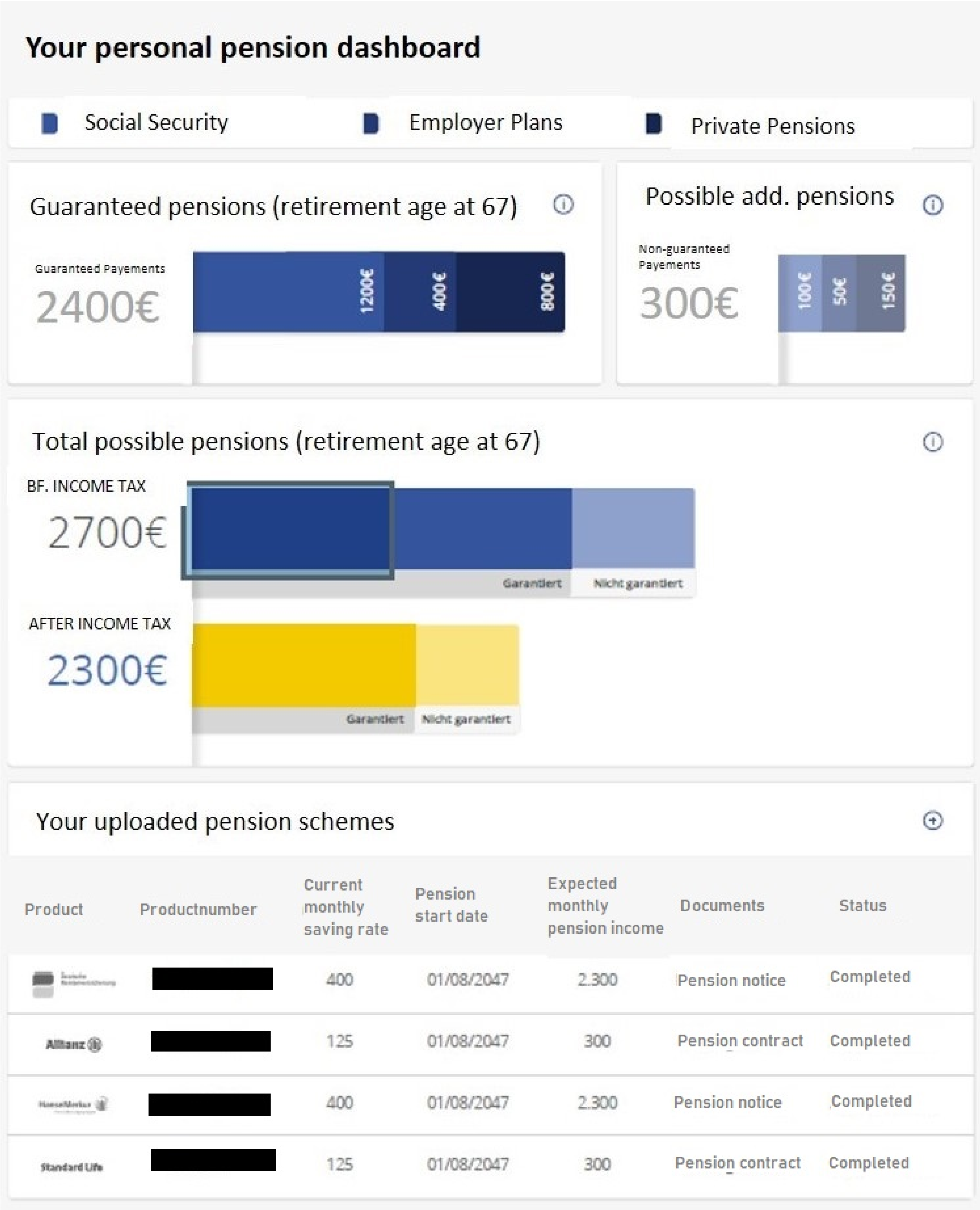
Sun, Liyang and Sarah Abraham, "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects," *Journal of Econometrics*, 2021, *225* (2), 175–199.

Electronic copy available at: https://ssrn.com/abstract=4260867

Figures

Electronic copy available at: https://ssrn.com/abstract=4260867

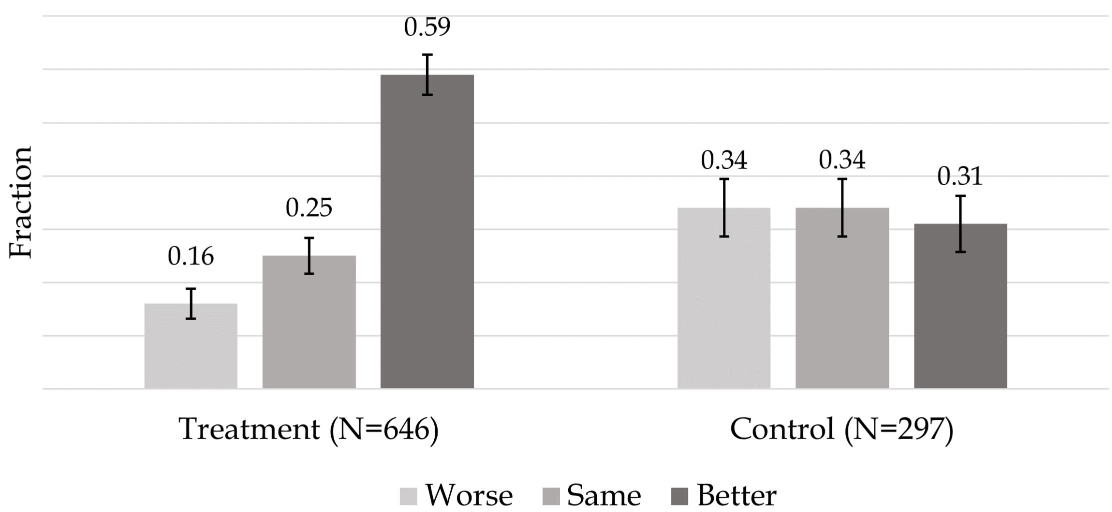
Figure 1: Pension dashboard screenshot



Notes: This figure shows an example Pension Dashboard (with German translated into English) as it is provided to participants in the treatment group.

Electronic copy available at: https://ssrn.com/abstract=4260867

Figure 2: Differences in subjective pension overview before and after treatment for treatment and control groups

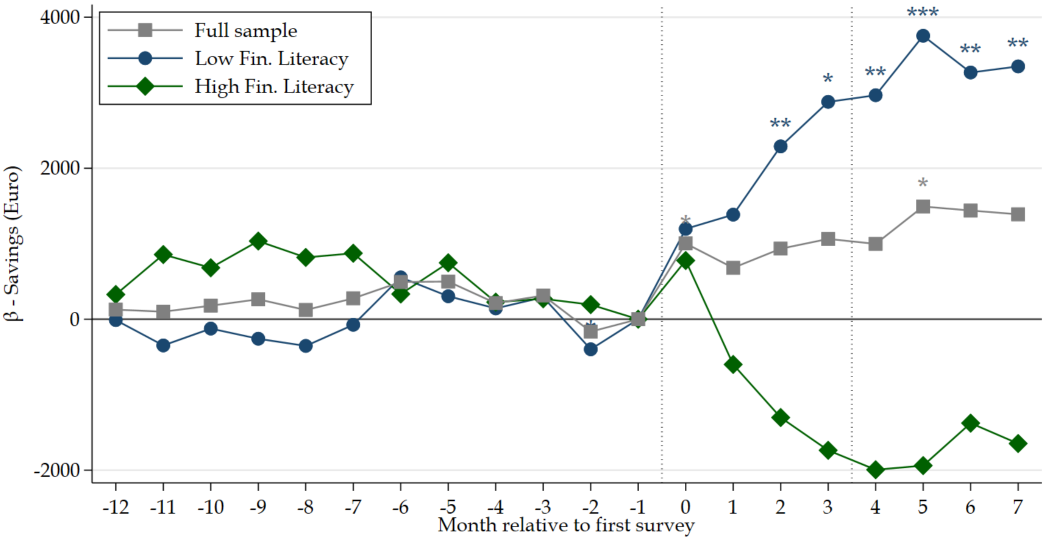


Notes: This figure illustrates changes in within-subject responses between Survey I (pre treatment) and III (post treatment) by treatment group. Subjects who rated their pension overview (on a 1-7 Likert scale) in Survey III higher than in Survey I are grouped into the category "Better". Accordingly, subjects who indicated the same or a lower score are grouped into categories "Same" and "Worse", respectively. The 95%-confidence intervals are reported.

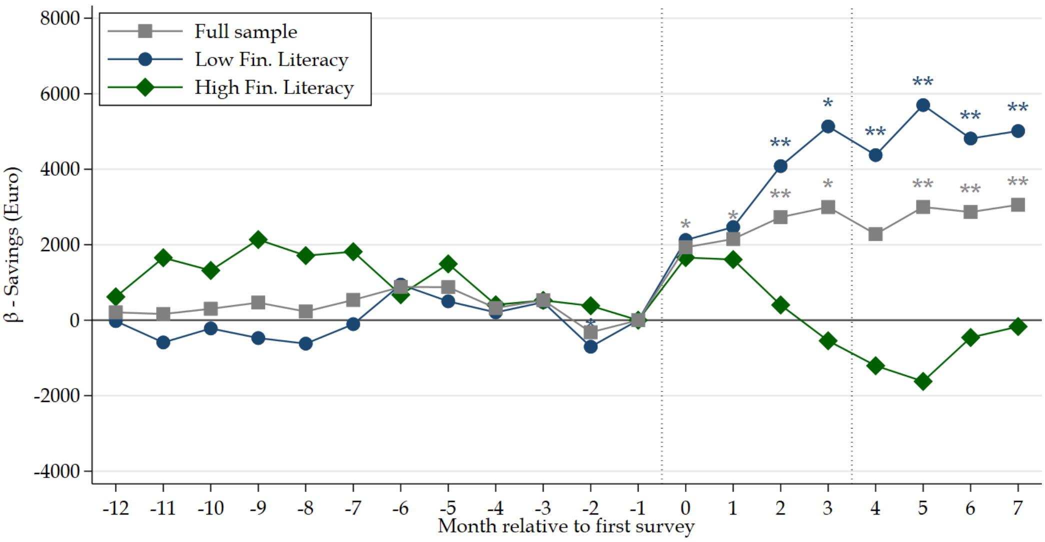
Electronic copy available at: https://ssrn.com/abstract=4260867

Figure 3: Changes in saving behavior - per period treatment effects for the full sample and by financial literacy

(a) All clients



(b) Active savers



Notes: These figures show β_t-estimates of our panel specification (Eq. 2) measuring the per period treatment effects. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is in the treatment group and zero otherwise. The displayed coefficients are estimated for all bank clients (Panel a) and only active savers (Panel b). The grey line in each figure represents the coefficients including all observations of the respective sample. The blue (green) line illustrates the coefficients for the sub-samples with low (high) financial literacy, respectively. The samples were split along the median of the financial literacy score (low: < 4). The x-axis indicates the month relative to the start of our intervention, which is signified by the first vertical dotted line. The second vertical line illustrates the end of our intervention. The month before the first survey ($t = -1$) is omitted and serves as point of reference. The precise estimates and corresponding t-values can be found in the Appendix (Table A8). * denotes significance at the 10-%, ** at the 5-% and *** at the 1-% levels, using robust standard errors.

Electronic copy available at: https://ssrn.com/abstract=4260867

Tables

Electronic copy available at: https://ssrn.com/abstract=4260867

Table 1: Summary statistics and balance check

Group	Full Sample	Control	Treatment		Zero Touch		Assigned to treat	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean (SD)	Mean (SD)	Mean (SD)	(3)-(2) (p-value)	Mean (SD)	(5)-(1) (p-value)	Mean (SD)	(7)-(2) (p-value)
Panel A: All clients								
Female	0.31	0.34	0.29	-0.044	0.36	0.051	0.30	-0.039
	(0.46)	(0.47)	(0.46)	(0.203)	(0.48)	(0.005)	(0.46)	(0.147)
Age	46.12	43.92	47.84	3.920	45.64	-0.482	45.49	1.574
	(8.94)	(9.65)	(7.94)	(0.000)	(8.68)	(0.148)	(8.64)	(0.002)
Single	0.39	0.43	0.35	-0.070	0.37	-0.016	0.39	-0.034
	(0.49)	(0.50)	(0.48)	(0.050)	(0.48)	(0.401)	(0.49)	(0.227)
Savings account (1=yes)	0.60	0.64	0.57	-0.071	0.56	-0.045	0.64	-0.003
	(0.49)	(0.48)	(0.50)	(0.050)	(0.50)	(0.019)	(0.48)	(0.906)
Active savings account (1=yes)	0.54	0.57	0.51	-0.055	0.46	-0.074	0.57	0.001
	(0.50)	(0.50)	(0.50)	(0.138)	(0.50)	(0.000)	(0.50)	(0.963)
Savings balance ($t = -12$)	3,022.64	2,739.39	3,243.17	503.78	4,460.48	1,437.84	4,549.25	1,809.86
	(11,355.75)	(10,280.33)	(12,134.79)	(0.548)	(22,983.11)	(0.091)	(21,300.29)	(0.130)
Wealth ($t = -12$)	22,932.70	21,295.88	24,207.07	2,911.20	20,412.91	-2,519.79	25,143.46	3,847.58
	(65,161.08)	(66,449.39)	(64,190.81)	(0.545)	(111,316.80)	(0.542)	(97,783.09)	(0.488)
Education (1=High school dipl.)	0.77	0.78	0.77	-0.016			0.76	-0.027
	(0.42)	(0.41)	(0.42)	(0.600)			(0.43)	(0.286)
Persons in household	2.56	2.54	2.58	0.041			2.58	0.047
	(1.19)	(1.22)	(1.16)	(0.640)			(1.21)	(0.505)
Financial literacy score (0-4)	3.27	3.15	3.36	0.217			3.25	0.107
	(0.77)	(0.85)	(0.69)	(0.000)			(0.77)	(0.026)
Perfect financial literacy score (1=yes)	0.39	0.32	0.44	0.112			0.38	0.056
	(0.49)	(0.47)	(0.50)	(0.002)			(0.49)	(0.046)
Subjective financial literacy (1-7)	5.08	5.02	5.13	0.108			4.91	-0.103
	(1.44)	(1.51)	(1.38)	(0.310)			(1.48)	(0.234)
Pension overview (1-7)	4.31	4.49	4.17	-0.315			3.95	-0.538
	(1.81)	(1.96)	(1.68)	(0.018)			(1.85)	(0.000)
Observations	747	327	420	747	8,008	8,755	2,880	3,207
Panel B: Active savers								
Female	0.33	0.37	0.30	-0.075	0.38	0.048	0.31	-0.062
	(0.47)	(0.48)	(0.46)	(0.113)	(0.49)	(0.058)	(0.46)	(0.084)
Age	46.02	43.93	47.82	3.889	46.17	0.146	45.40	1.471
	(9.17)	(9.79)	(8.20)	(0.000)	(8.69)	(0.751)	(8.73)	(0.032)
Single	0.38	0.42	0.34	-0.082	0.35	-0.026	0.40	-0.022
	(0.49)	(0.50)	(0.48)	(0.091)	(0.48)	(0.307)	(0.49)	(0.570)
Savings balance ($t = -12$)	5,612.93	4,808.04	6,306.03	1,498.00	9,606.54	3,993.61	7,977.95	3,169.91
	(15,011.03)	(13,275.92)	(16,357.52)	(0.319)	(33,008.49)	(0.016)	(27,723.95)	(0.124)
Wealth ($t = -12$)	31,026.05	25,761.16	35,559.70	9,798.54	33,281.35	2,255.30	34,362.47	8,601.31
	(68,418.36)	(64,694.50)	(71,307.37)	(0.153)	(124,152.10)	(0.720)	(105,839.70)	(0.278)
Education (1=High school dipl.)	0.78	0.80	0.77	-0.033			0.77	-0.035
	(0.41)	(0.40)	(0.42)	(0.431)			(0.42)	(0.284)
Persons in household	2.50	2.48	2.50	0.021			2.53	0.044
	(1.18)	(1.25)	(1.13)	(0.861)			(1.19)	(0.630)
Financial literacy score (0-4)	3.20	3.08	3.30	0.222			3.23	0.154
	(0.81)	(0.91)	(0.70)	(0.008)			(0.79)	(0.018)
Perfect financial literacy score (1=yes)	0.35	0.30	0.38	0.083			0.37	0.068
	(0.48)	(0.46)	(0.49)	(0.081)			(0.48)	(0.068)
Subjective financial literacy (1-7)	5.06	5.01	5.11	0.096			4.87	-0.139
	(1.41)	(1.48)	(1.34)	(0.497)			(1.47)	(0.223)
Pension overview (1-7)	4.39	4.61	4.20	-0.408			3.96	-0.643
	(1.83)	(1.94)	(1.72)	(0.026)			(1.82)	(0.000)
Observations	402	186	216	402	3,714	4,116	1,642	1,828

Notes: This table displays the mean and standard deviations of key variables and demographics for different experimental groups (Columns 1-3, 5, and 7) as well as a balance check between the control and the treatment group (Column 4) and, respectively, the subjects that were assigned to treat (Column 8). Panel A considers all clients in our sample. Panel B only considers active savers. The p-values of standard Student's t-tests of the differences between the means are in brackets. Column 6 illustrates differences in means of different variables (and corresponding p-values) between a random sample of bank clients (zero touch) and clients that participated in our study, only considering subjects in the control and treatment groups (full sample). All variables that are available for the zero touch group refer to administrative bank data, while the other variables are taken from the first survey. Balances refer to the first month of available bank data ($t = -12$). The savings account dummy indicates whether an individual possesses a savings account according to information provided by the banks. In contrast, active savings accounts are defined as savings accounts whose monthly balances show a non-zero standard deviation in the months before our intervention. The financial literacy score variable is based on respondents who answered all four questions.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table 2: Average treatment effects for different savings and wealth measures

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients				Active Savers	
Dep. variable	Savings	Wealth	Net wealth	Savings and portfolio acc.	Savings	Wealth
Panel A: Full sample						
Treatment Effect	1,126.89	1,984.47	3,231.26	1,706.05	2,444.32	4,549.91
	(1.16)	(0.99)	(1.26)	(0.88)	(1.56)	(1.91)
N	11,846	11,846	11,846	11,846	6,392	6,392
Panel B: Low financial literacy						
Treatment Effect	3,354.13	4,382.34	6,202.38	4,076.53	5,018.68	6,682.29
	(2.38)	(2.05)	(2.11)	(2.00)	(2.16)	(2.03)
N	7,270	7,270	7,270	7,270	4,188	4,188
Panel C: High financial literacy						
Treatment Effect	-2,265.17	-2,410.17	-1,883.76	-2,557.09	-1,924.59	285.98
	(-1.56)	(-0.53)	(-0.37)	(-0.57)	(-1.38)	(0.09)
N	4,576	4,576	4,576	4,576	2,204	2,204
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the average treatment effects (corresponding t-statistics in brackets) according to Eq. 1, comparing changes in the monthly averages of different wealth measures before and after our intervention between the control and the treatment groups. Months in which our intervention took place are excluded ($t = 1, 2, 3$). All estimations include time and individual fixed effects. Wealth is defined as the sum of savings, portfolio, and checking account balance. In Column 3, we subtract the outstanding (mortgage) credit balances from the wealth measure. Column 4 uses the sum of savings and portfolio balances as the dependent variable. The last two columns consider active savers. We use robust standard errors.

Electronic copy available at: https://ssrn.com/abstract=4260867

Online Appendix

Tabea Bucher-Koenen[1] Andreas Hackethal[2] Johannes Kasinger[3]

Christine Laudenbach[4]

A Additional descriptive statistics and variables

A.1 Variable description and financial literacy questions

Table A1 gives an overview and detailed descriptions of the variables used in our study. The third column shows the respective data source. Table A2 shows the distribution of the answers to the financial literacy questions used to calculate the financial literacy score in the full sample and disaggregated by experimental groups. For all questions, the subjects had the option to not answer the question, which is signified by "N/A". Only correct answers counted towards the financial literacy score.

A.2 Visual inspection of trends in outcome variables

Figure A1 shows the average monthly savings balances (Panel a) and aggregated monthly wealth (Panel b) by experimental groups. The x-axis indicates the month relative to the start of our intervention. The two vertical dotted lines illustrate our intervention period. Visually, the experimental groups share a common trend in average monthly savings balances prior to our intervention. During our intervention, the monthly savings balances increase on average. The increase is considerably more pronounced in the treatment group. These visual patterns are reaffirmed by our estimation results (Section 4.2). The same visual pattern can be observed if we examine trends in the average monthly wealth levels across different groups, at least after controlling for time trends in overall wealth levels. Corresponding estimation results using a different definition of wealth can be found in Figure A3. The visual patterns—common trends prior to the experiment and a strong increase in the treatment group during our intervention period—are stable if we use winsorized balances or if we examine average monthly standard deviations of the respective balances (results not shown).

[1]Contact: Tabea Bucher-Koenen, ZEW - Leibniz Centre for European Economic Research and Mannheim University, L9, 1, 68161 Mannheim, Germany, Email: tabea.bucher-koenen@zew.de

[2]Andreas Hackethal, Goethe University Frankfurt, Email: Hackethal@finance.uni-frankfurt.de

[3]Johannes Kasinger, Goethe University Frankfurt, Email: Kasinger@safe-frankfurt.de

[4]Christine Laudenbach, SAFE and Goethe University, Email: laudenbach@safe-frankfurt.de

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A1: Variable description

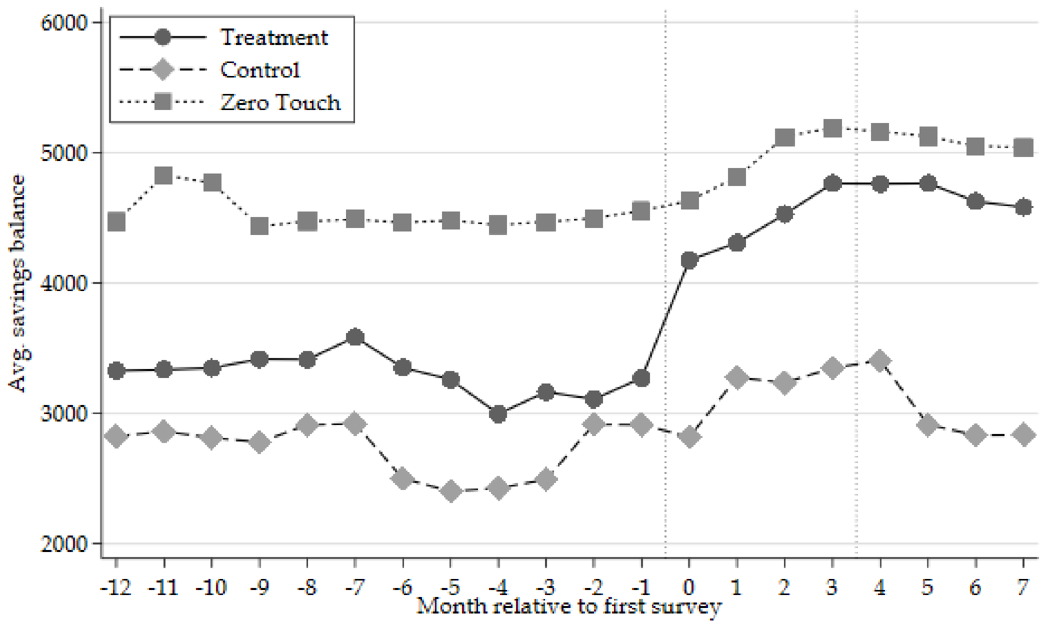
Variable Name	Description	Source
Female	An indicator variable that is equal to one if the participant is female and zero if male. For joint accounts (5.49% of all subjects in the full sample) the dummy was set to zero.	Bank
Age	Age of participant in years. For joint accounts, the number refers to the age of the oldest partner.	Bank
Single	An indicator variable that is equal to one if the participant's marital status is single at the end of 2016 (one month prior to our intervention)	Bank
Savings account (1=yes)	An indicator that is equal to one if the participant has access to a savings account with the bank	Bank
Active savings account (1=yes)	An indicator that is equal to one if the standard deviation of participant's savings balance was larger than zero in the year prior to the experiment	Bank
Saving balance ($t = -12$)	Savings account balance at the end of January 2016 in euros	Bank
Wealth ($t = -12$)	Wealth is equal to the sum of savings account, transfer account, and portfolio balances at the end of January 2016 in euros	Bank
Education (1=High school dipl.)	An indicator variable that is equal to one if the participant has matriculation standard education and zero if lower education.	S1
Persons in household	Number of persons that live in participant's household, including herself	S1
Financial literacy score (0-4)	Sum of correct answers (one point per correct answer) to the three Big Three financial literacy questions (Lusardi and Mitchell, 2014) plus a fourth more difficult question on compounding interest. The questions and possible answer options were as follows (correct answer in bold print): • Q1: "Suppose you had \$100 in a savings account and the interest rate was 2 percent per year. After 5 years, how much do you think you would have in the account if you left the money to grow: [**more than \$102**; exactly \$102; less than \$102; do not know; refuse to answer.]" • Q2: "Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year. After 1 year, would you be able to buy: [more than, exactly the same as, or **less than today** with the money in this account; do not know; refuse to answer.]" • Q3: Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund." [true; **false**; do not know; refuse to answer.] • Q4: Assume you had 100 euros in an account, with 5 percent interest per year. If you do not withdraw any money, how much balance does your account have after 10 years? [Open answer field. Answers were counted as correct if they fall within an error margin of 5% from the correct answer (**162.9**) rounded to the next integer, i.e., between 154.9 and 170.9]	S1
Subjective financial literacy (1-7)	Extent participant agrees with the statement "My personal knowledge of financial matters in general is good." (1=fully disagree to 7=fully agree).	S1
Subjective pension overview (1-7)	Extent participant agrees with the statement "I have a good overview of my accumulated pension entitlements today" (1=fully disagree to 7=fully agree).	S1 & S3

Notes: This table describes all variables used in our study. Source "Bank" refers to administrative data that we received from the banks. Source "S1" signifies survey data from Survey I and "S3" survey data from Survey III.

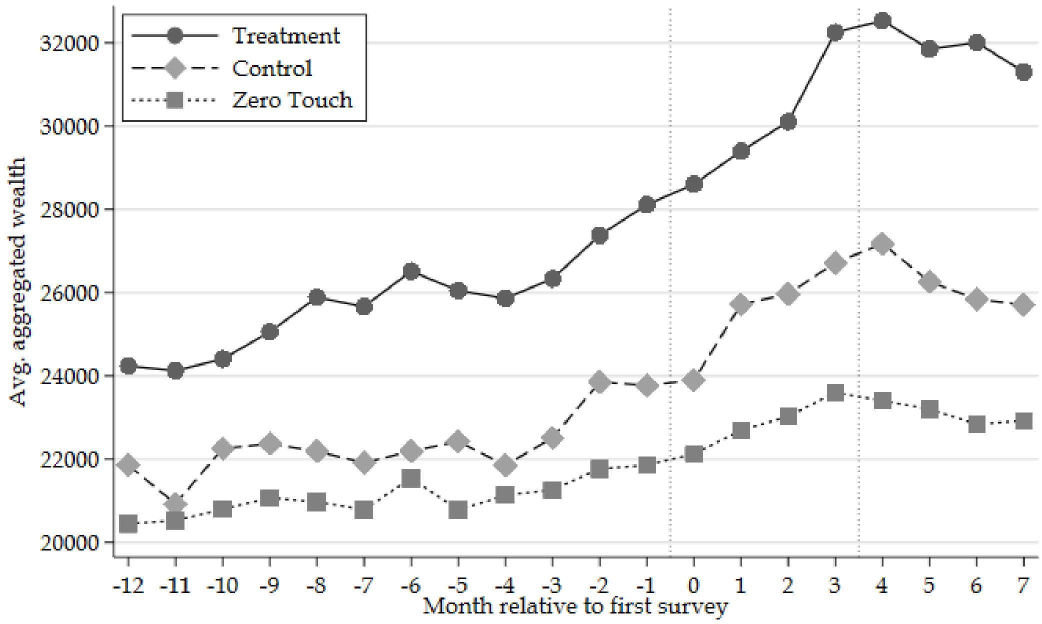
Electronic copy available at: https://ssrn.com/abstract=4260867

Figure A1: Savings and wealth - average monthly balances for different experimental groups

(a) Savings balances



(b) Wealth



Notes: These figures plot the average savings balances (Panel a) and aggregated wealth (Panel b) by month and experimental groups. Savings balances refers to balances on savings accounts. Wealth measures the sum of the balances on savings, transactions, and portfolio accounts. The x-axis indicates the month relative to the start of our intervention, which is signified by the first vertical dotted line. The second vertical line illustrates the end of our intervention window.

Electronic copy available at: https://ssrn.com/abstract=4260867

A.3 Pension dashboard data

In this section we briefly discuss the data from the pension dashboard itself. This is helpful in order to understand the value and nature of our treatment. Participants in the treatment group were invited to upload all available pension documents into the system. The information in these documents was compiled into the pension overview. Participants in the treatment group uploaded information on 4.5 product contracts on average.[5] The average expected total gross retirement income is 3,287 euros with a standard deviation of 1,985 euros. Looking into the specific pension pillars, we find that 87.6% of the participants have uploaded information on the current level of their state pension. Conditional on reporting a state pension, the average future value of the state pension is around 1,825 euros. Documents on occupational pensions are uploaded by 62.4% of the participants; the average expected pension income is about 739 euros, conditional on reporting an occupational pension. Private pensions are reported by 61.2% of the participants with an average future value of 306 euros. The majority of the participants expect pension income from multiple pillars, 59% expect at least a pension income from state and occupational pensions, and 56% expect a combination of state and private pensions. 38.6% even expect pension income from all three pillars, i.e., state, occupational, and private pensions. Overall, these data indicate that the portfolios of the participants are complex and that the dashboard is likely to be a valuable tool for the pension planning of those individuals. Compared to the pension portfolios of average Germans, these individuals own more pension products and show a greater coverage with occupational and private pensions and higher expected pensions. Table A3 shows the summary statistics of the key pension dashboard output variables by financial literacy. The differences in means of the variables between the low and high literacy sub-samples are small and statistically insignificant (see Column 3).

[5]For these summary statistics, we only consider treated individuals for which bank administrative data is available.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A2: Financial literacy - distribution of answers

	Full Sample			Control			Treatment			Assigned to Treat		
	Correct	False	N/A	Correct	False	N/A	Correct	False	N/A	Correct	False	N/A
Q1	706	38	3	298	26	3	408	12	0	2,701	152	27
In %	94.51	5.09	0.40	91.13	7.95	0.92	97.14	2.86	0.00	93.78	5.28	0.94
Q2	707	35	5	300	24	3	407	11	2	2,694	154	32
in %	94.65	4.69	0.67	91.74	7.34	0.92	96.90	2.62	0.48	93.54	5.35	1.11
Q3	646	96	5	270	54	3	376	42	2	2,438	408	34
in %	86.48	12.85	0.67	82.57	16.51	0.92	89.52	10.00	0.48	84.65	14.17	1.18
Q4	321	372	54	122	173	32	199	199	22	1,237	1,411	232
in %	42.97	49.80	7.23	37.31	52.91	9.79	47.38	47.38	5.24	42.95	48.99	8.06
All Big Three Q correct	615	132		250	77		365	55		2,298	582	
in %	82.33	17.67		76.45	23.55		86.90	13.10		79.79	20.21	
All 4 Q correct	289	458		106	221		183	237		1,096	1,784	
in %	38.69	61.31		32.42	67.58		43.57	56.43		38.06	61.94	

Notes: This table displays the distribution (and respective fractions) of the answers to the Big Three financial literacy questions, Q1-Q3, (Lusardi and Mitchell, 2014) plus a fourth more difficult question on compounding interest (Q4) in different experimental groups. The subjects had the option to not answer the question, which is signified by "N/A". All clients in our sample are considered.

Table A3: Pension dashboard summary statistics by financial literacy

	(1)	(2)	(3)
	Financial literacy score		
	< 4	$= 4$	
	Mean	Mean	(1)-(2)
	(SD)	(SD)	(p-value)
Panel A: Full sample			
Expected retirement income (total)	3,227.91	3,365.35	-137.439
	(1,827.81)	(2,175.30)	(0.482)
Guaranteed retirement income (total)	2,283.50	2,472.41	-188.910
	(1,340.41)	(1,627.58)	(0.193)
Number of uploaded products	4.45	4.52	-0.073
	(3.27)	(2.81)	(0.809)
N	237	183	420
Panel B: Only active savers			
Expected retirement income (total)	3,192.06	3,114.83	77.233
	(1,956.64)	(1,812.93)	(0.772)
Guaranteed retirement income (total)	2,263.18	2,314.14	-50.962
	(1,471.01)	(1,324.68)	(0.797)
Number of uploaded products	4.67	4.58	0.091
	(3.83)	(2.74)	(0.851)
N	133	83	216

Notes: This table displays the mean and standard deviations of key output variables from subjects' pension dashboards, disaggregated by financial literacy score. Column 3 reports the difference in the variables and the p-value of a corresponding two-sided t-test (in brackets).

Electronic copy available at: https://ssrn.com/abstract=4260867

B Matching of administrative records and survey data

To make sure that the incomplete matching of bank clients does not harm our analyses, we regress an indicator that equals one if a participant could be matched with bank administrative data, and zero otherwise, on variables that were collected in the first survey. We use a Logit specification. The results are shown in Table A4. We consider all participants in the control and treatment groups that filled out the first survey. Observations may differ because of missing survey responses. Age refers to the self-indicated age in Survey I here and may differ from the bank administrative data. The (self-indicated) variables "number of kids" and "persons in households" show extreme and unrealistic values and were thus trimmed at the 99% percentile. After controlling for the respective bank, none of the survey variables has predictive power for whether or not a bank client could be matched by the bank.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A4: Logit regression - Administrative data matching check

	(1) β-Coef. (t-stat.)	(2) β-Coef. (t-stat.)	(3) β-Coef. (t-stat.)	(4) β-Coef. (t-stat.)	(5) β-Coef. (t-stat.)	(6) β-Coef. (t-stat.)	(7) β-Coef. (t-stat.)
Financial literacy score	-0.0432						-0.0570
	(-0.83)						(-0.94)
Subjective financial literacy		-0.0322					-0.0338
		(-1.27)					(-1.09)
Education			-0.0496				-0.0957
			(-0.52)				(-0.82)
Number of kids				-0.0495			-0.0517
				(-1.53)			(-1.02)
Persons in household					-0.0100		0.0761
					(-0.29)		(1.48)
Age (S1)						0.00215	0.00119
						(0.57)	(0.26)
Bank	-0.582	-0.574	-0.570	-0.564	-0.567	-0.209	-0.201
	(-7.14)	(-7.34)	(-7.28)	(-7.15)	(-7.21)	(-2.42)	(-2.20)
Constant	0.240	0.227	0.0951	0.114	0.0907	-0.0610	0.318
	(1.11)	(1.26)	(0.67)	(0.86)	(0.60)	(-0.27)	(0.87)
Observations	2879	3158	3158	3101	3107	2212	1976

Notes: This table shows the estimated coefficients and corresponding t-statistics of a Logit regression that regresses an indicator that equals one if a participant could be matched with bank administrative data, and zero otherwise, on variables that were collected in Survey I. All participants in the control and treatment groups that filled out the first survey are considered here. Observations differ as absent survey responses were treated as missing in the respective regression. Age (S1) refers to the self-indicated age in Survey I and may differ from bank administrative data. The variables "Number of kids" and "Persons in households" were trimmed at the 99% percentile to rule out that results are driven by outliers in survey responses.

Electronic copy available at: https://ssrn.com/abstract=4260867

C Intention to treat analyses

As discussed in section 3.2, there is a substantial amount of non-random attrition during the experiment. We already took care of all time-invariant observable and unobservable differences that threaten identification in the two-way fixed effects DiD model. As an alternative empirical strategy, we estimate ITT effects based on the assignment to the treatment group. We present and discuss reduced from effects (ITT). Estimating the per period intention-to-treat (ITT) effects, we estimate Eqs. 1 and 2 with the difference that P_i equals 1 if an individual has been assigned to the treatment or to the control group and T_i is a dummy variable that equals 1 if individual i has been assigned to the treatment group. The results are robust to any attrition and can be interpreted as the causal effect of a treatment offer. Not surprisingly, we find substantially smaller effects of the intervention on saving behavior in the ITT analyses.

The average treatment effects are shown in Table A5. In the full sample, the average savings balance increased by 433 euros in the "assigned-to-treatment" compared to the control group. The estimated ITT effect is equal to 336 euros if we consider overall wealth as a dependent variable and 1,013 euros for net wealth (none of the effects are statistically significant). If we split the sample by financial literacy, the overall pattern of saving adaptions is as before with positive saving adaptions in the low and negative savings adaptions in the high financial literacy sub-samples (none of the changes are statistically significantly different from zero). If we only consider active savers, the ITT effects increase and become significant at the 10%-level for wealth as a dependent variable (see Column 6).

In Figure A2, we show the estimated beta coefficients over time. As before, we find positive saving adaptions in particular for the sub-sample of low financial literacy. The coefficients are positive and significant in the periods $t = 5, 6$ both in the low literacy sample and the sample of active savers. These are the first two periods after all participants in the sample received access to the pension dashboard, reaffirming our previous findings. The estimated ITT effects are robust and the coefficients in the low literacy subsamples higher if we use the median subjective financial literacy measure as a cutoff value (Panels c and d of Figure A4).

Small ITT effect coefficients are not surprising due to the small share of compliers (14.5%). To account for the small fraction of compliers, we also run a two-stage instrumental variable regression using the treatment assignment as an instrument for treatment uptake, as suggested by Angrist and Pischke (2008)—treatment-on-the-treated (TOT) effect. Average TOT effects are shown in Table A5 and dynamic TOT effects in Panels c and d of Figure A2. The effects after treatment become even larger than the effects estimated before, in particular in the periods after the full introduction of the treatment

Electronic copy available at: https://ssrn.com/abstract=4260867

($t = 5, 6, 7$) where the effects range between 1,955 and 4,146 euros. Effects are even larger in the sub-sample of low financial literacy. Weighting the ITT results by the fraction of compliers (13.3%) reveals values of statistically significant additional savings of more than 7,500 euros in the periods $t = 5, 6$.

Table A5: Average ITT effects for different wealth measures

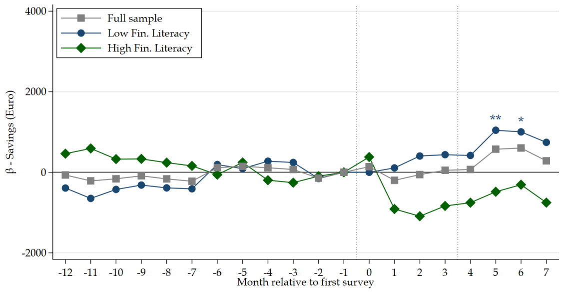
	(1)	(2)	(3)	(4)	(5)	(6)
	All clients				Active savers	
Dep. variable	savings	wealth	net wealth	savings and portfolio acc.	savings	wealth
Panel A: Full sample						
ITT effect	433.12 (0.69)	336.59 (0.20)	1,013.64 (0.46)	-116.65 (-0.07)	1,235.74 (1.53)	2,505.54 (1.70)
TOT effect	2,976.11 (0.69)	2,312.81 (0.20)	6,965.14 (0.46)	-801.58 (-0.07)	9,430.55 (1.53)	19,121.10 (1.69)
N	51,040	51,040	51,040	51,040	29,172	29,172
Panel B: Low financial literacy						
ITT effect	959.74 (1.49)	1,063.16 (0.83)	1,517.35 (0.64)	380.12 (0.34)	1,417.87 (1.31)	2,363.32 (1.32)
TOT effect	7,232.04 (1.49)	8,011.37 (0.83)	11,433.91 (0.64)	2,864.38 (0.34)	11,071.01 (1.31)	18,453.31 (1.32)
N	31,906	31,906	31,906	31,906	18,605	18,605
Panel C: High financial literacy						
ITT effect	-714.83 (-0.52)	-1,588.94 (-0.36)	-536.10 (-0.11)	-1,614.30 (-0.37)	727.60 (0.80)	2,033.41 (0.84)
TOT effect	-4,295.86 (-0.52)	-9,548.90 (-0.36)	-3,221.74 (-0.11)	-9,701.32 (-0.37)	5,345.96 (0.80)	14,940.35 (0.84)
N	19,134	19,134	19,134	19,134	10,567	10,567
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the average ITT and TOT effects (corresponding t-statistics in brackets) according to Eq. 1, comparing changes in the monthly averages of different wealth measures before and after our intervention between the control and the assigned treatment group. Months in which our intervention took place are excluded. All estimations include time and individual fixed effects. TOT effects correspond to the ITT effects re-weighted by the share of compliers. Wealth is defined as the sum of savings, portfolio, and checking account balances. In Column 3, we deduct the outstanding (mortgage) credit balances from the wealth measure. Column 4 uses the sum of savings and portfolio balances as the dependent variable. The last two columns consider active savers. We use robust standard errors for the ITT effects and bootstrapped standard errors for the TOT effects.

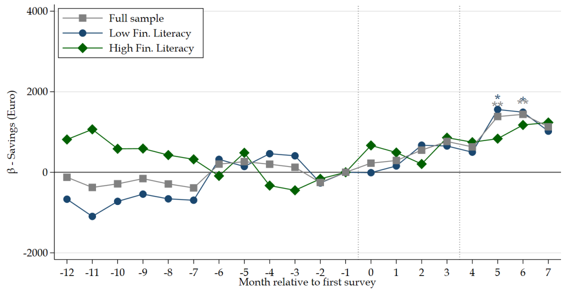
Electronic copy available at: https://ssrn.com/abstract=4260867

Figure A2: Per period ITT and TOT effects for full sample and active savers and by financial literacy

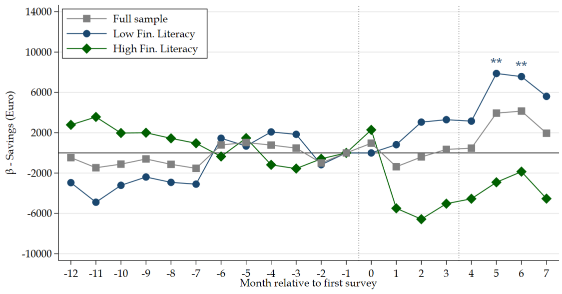
(a) ITT effects - full sample



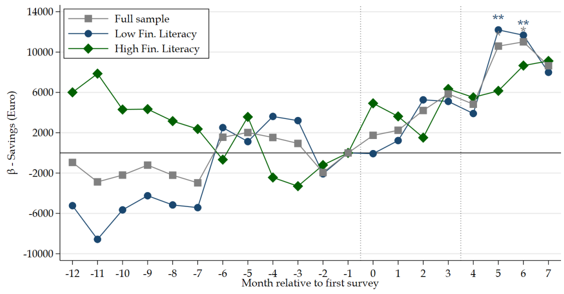
(b) ITT effects - active savers



(c) TOT effects - full sample



(d) TOT effects - active savers



Notes: These figures shows β_t-estimates of our panel specification (Eq. 2) measuring the per period ITT effects. All estimations include time and individual fixed effects and use the monthly saving balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is assigned to the treatment group and zero otherwise. The displayed coefficients are estimated for all bank clients (Panels a and c) and for a sample that only includes active savers (Panels b and d). The grey line in each sub-figure represents the coefficients including all observations of the respective sample. The blue (green) line in each sub-figure illustrates the coefficients for the sub-sample with low (high) financial literacy. The samples were split along the median of the financial literacy score (low: < 4). Panels a and b show the ITT effects, while Panels c and d, show the TOT effects. TOT effects are estimated in a two-stage instrumental variable regression, re-weighting the ITT effects by the respective share of compliers. The x-axis indicates the month relative to the start of our intervention, which is signified by the first vertical dotted line. The second vertical line illustrates the end of our intervention. We omit the month before the first survey ($t = -1$). The estimates and corresponding t-values can be found in Tables A9 and A10. * denotes significance at the 10-%, ** at the 5-% and *** at the 1-% level, using robust standard errors.

Electronic copy available at: https://ssrn.com/abstract=4260867

D Additional Analyses - Robustness

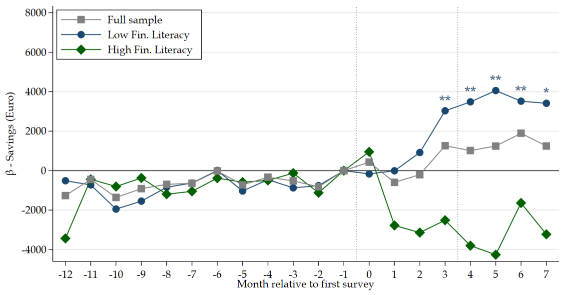
D.1 Alternative measure of wealth

Analogous to the average treatment effects (shown in Table 2), we also estimate the dynamic specification (Eq. 2) for different measures of wealth. The results are shown in Figure A3. Generally, the per period treatment effect sizes increase for the different wealth measures compared to using savings balances as a dependent variable. The significance levels are similar. The differences in savings adaptions between low and high literacy sub-samples persist, suggesting that the difference in saving adaptions are indeed driven by the fact that the treatment information is more valuable to low literacy than to high literacy clients, and not driven by a higher propensity of low literacy clients to use savings balances as their saving device.

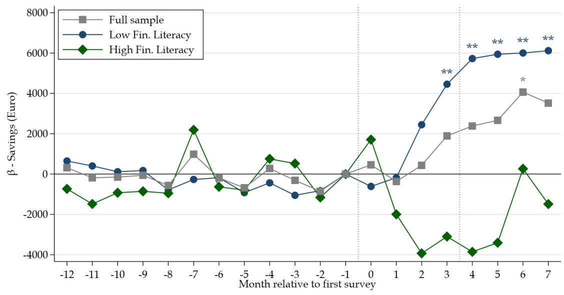
Electronic copy available at: https://ssrn.com/abstract=4260867

Figure A3: Per period treatment effects for different outcome variables

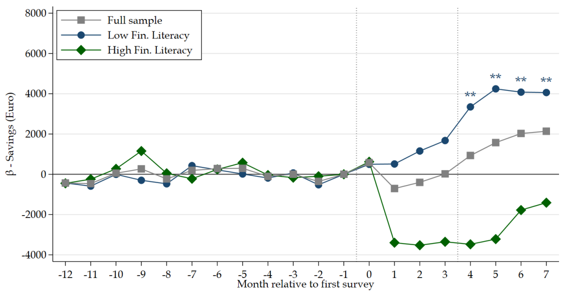
(a) Wealth



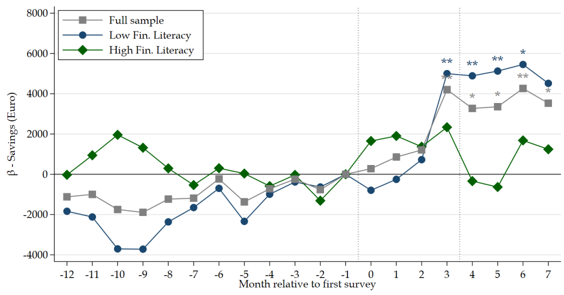
(b) Net wealth



(c) Savings and portfolio acc.



(d) Wealth - active savers



Notes: This figures shows β_t-estimates of our panel specification (Eq. 2) measuring the per period treatment effects. All estimations include time and individual fixed effects. T_i equals 1 if individual i is in the treatment group and zero otherwise. The displayed coefficients are estimated for alternative dependent variables ($Y_{i,t}$): wealth (Panel a), net wealth (Panel b), sum of savings and portfolio accounts (Panel c) and wealth, only considering active savers (Panel d). The grey line in each subfigure represents the coefficients including all observation of the respective sample. The blue (green) line in each subfigure illustrates the coefficients for the subsample with low (high) financial literacy. The samples were split along the median of the financial literacy score (low: < 4). The x-axis indicates the month relative to the start of our intervention, which is signified by the first vertical dotted line. The second vertical line illustrates the end of our intervention. We omit the month before the first survey ($t = -1$). The estimates and corresponding t-values can be found in Tables A11 and A12. * denotes significance at the 10-%, ** at the 5-% and *** at the 1-% level, using robust standard errors.

Electronic copy available at: https://ssrn.com/abstract=4260867

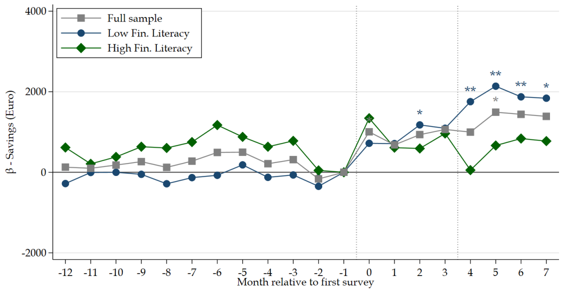
D.2 Alternative measure of financial literacy

We split the sample using the median of subjective financial literacy as an alternative to the test-based financial literacy measure. The results are presented in Figure A4. Considering all subjects (Panel a), we find a similar difference in per period treatment effects between subsamples with low and high subjective financial literacy. Again, we find the largest and most significant effects for the low literacy subsample in the last four periods, with effects ranging from 1,754 to 2,138 euros. The per-period treatment effects in the subsample of high financial literacy are insignificant. The differences vanish if we consider active savers only. Here the per-period treatment effects in the full sample and the subsamples are similar with no apparent differences.

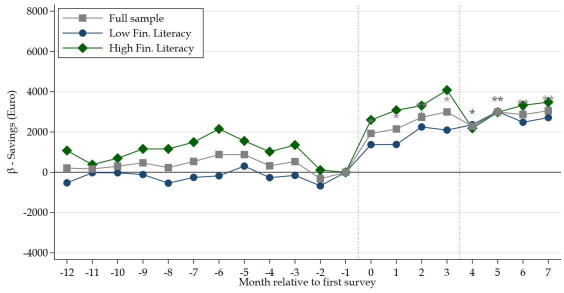
Electronic copy available at: https://ssrn.com/abstract=4260867

Figure A4: Per period treatment and ITT effects for full sample and subsamples split by subjective financial literacy

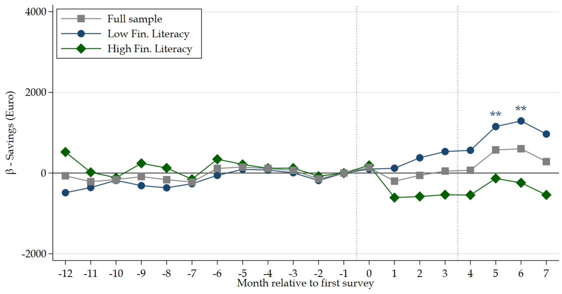
(a) Treatment effects—all



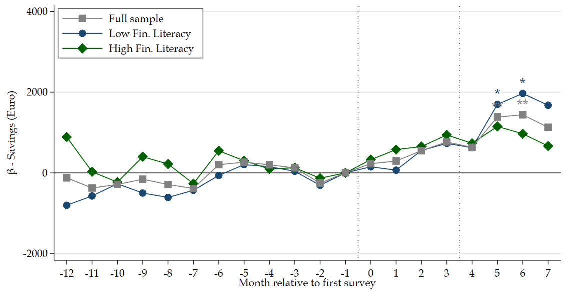
(b) Treatment effects—active savers



(c) ITT effects—all



(d) ITT effects—active savers



Notes: These figures show β_t-estimates of our panel specification (Eq. 2) measuring the per period treatment and ITT effects. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is in the treatment group and zero otherwise. The displayed coefficients are estimated for all bank clients (Panels a and c) and for a sample that only includes active savers (Panels b and d). The grey line in each figure represents the coefficients including all observation of the respective sample. The blue (green) line in each figure illustrates the coefficients for the sub-samples with low (high) subjective financial literacy, respectively. The sample was split along the median of the self-indicated subjective financial literacy score (on 1-7 Likert scale; low: ≤ 5). Panels c and d use treatment assignment instead of actual treatment to estimate ITT effects. The x-axis indicates the month relative to the start of our intervention. The vertical lines signify the intervention period. We omit the month before the first survey ($t = -1$). The estimates and corresponding t-values can be found in Tables A13 and A14. * denotes significance at the 10-%, ** at the 5-% and *** at the 1-% level, using robust standard errors.

Electronic copy available at: https://ssrn.com/abstract=4260867

D.3 Dealing with outliers

We test whether our treatment effects are driven by outliers. For this purpose, we winsorize monthly savings balances at the 1% and 99% percentiles as well as at the 5% and 95% percentiles. Moreover, we trim our sample along two dimensions: i) individuals whose average savings account balances before our intervention exceed the 99%- percentile; and ii) individuals whose average savings adaptions lie below the 1%-percentile or above the 99%-percentile.[6]

D.3.1 Winsorizing

First, we winsorize the monthly savings balances at the 1% and 99%-percentiles of the respective months. Results remain robust if we consider all subjects as well as the sample of active savers only (see Panels a and b of Figure A5). In fact, the t-statistics of the per period treatment effects increases on average even if the magnitude of the coefficients slightly decreases compared to the base case. In the sub-samples of low literacy, both for all subjects and active savers only, coefficients are now significant at the 5%- level for all periods after the intervention with few exceptions. For the fourth and fifth month after the first intervention, coefficients are significant at the 1%-level. The statistical significance also slightly increases for the full sample of active savers.

If we winsorize at the 5-% and 95-% percentiles, the effects vanish for the sample that includes all subjects (see Panel c of Figure A5), which is not surprising as the sample includes all inactive savers, which in turn affects the monthly percentiles. If we only consider active savers (Panel d of Figure A5), the effect size decreases compared to winsorizing at the 1% and 99%-percentiles, but the same pattern along financial literacy persists. The effect for the low literacy sub-sample in period $k = 5$ remains significant at the 5%-level while it is only significant at the 10%-level in $k = 2, 6, 7$. For the full sample, we do not find significant treatment effects.

D.3.2 Trimming

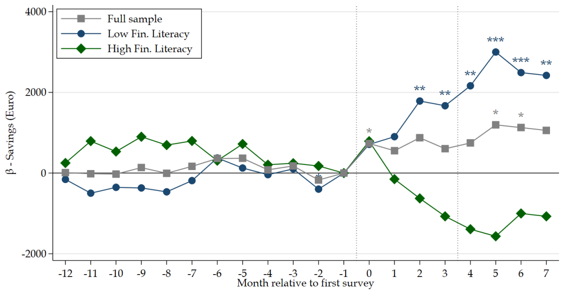
Tables A6 and A7 present our estimation results for the trimmed samples. As can be seen in Table A6, the results remain very robust both in terms of size and significance if we trim the sample along average pre-intervention savings account balances. This holds true if we consider all subjects as well as active savers only. In contrast, cutting the sample along average savings adaptions decreases the size and significance levels for most periods. However, if we consider all subjects, β_2 remains significant at the 5%-level for

[6]Savings adaption refers to the difference in average savings balances before and after our intervention, excluding periods during which the experiment took place (as in Table 2). Calculating the percentiles, we only consider individuals in experimental groups with access to a savings account.

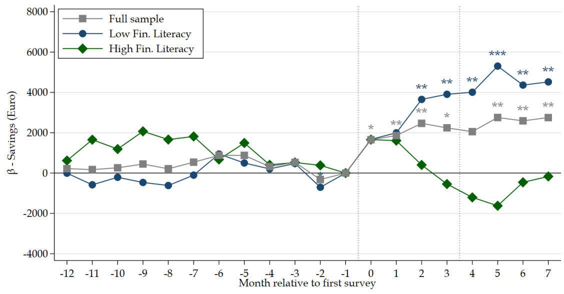
Electronic copy available at: https://ssrn.com/abstract=4260867

Figure A5: Per period treatment effects for full sample and low/high financial literacy sub-samples—winsorized at different percentiles of monthly savings balances

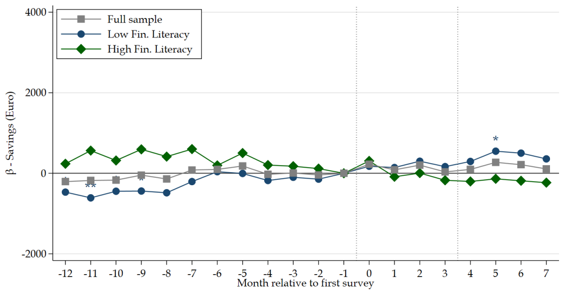
(a) 1%–99%-percentiles—full sample



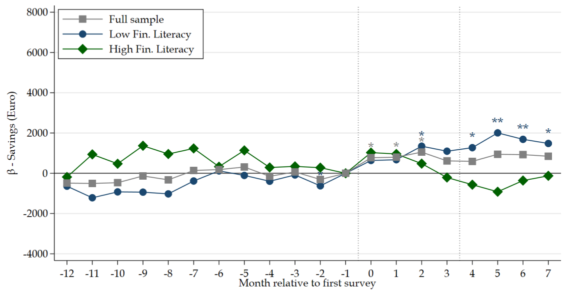
(b) 1%–99%-percentiles—active savers



(c) 5%–95%-percentiles—full sample



(d) 5%–95%-percentiles—active savers



Notes: These figures show β_t-estimates of our panel specification (Eq. 2) measuring the per-period treatment effects using samples winsorized at different percentiles of monthly savings balances. Panels a and b (c and d) winsorize savings balances at the 1%- and 99% (5%- and 95%)-percentiles of savings balances in the respective months. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). The displayed coefficients are estimated for all bank clients (grey line) and for different financial literacy sub-samples. The blue (green) line in each figure illustrates the coefficients for subjects with low (high) financial literacy. The x-axis indicates the month relative to the start of our intervention. The intervention period is signified by the vertical lines. We omit the month before the first questionnaire ($t = -1$). The precise estimates and corresponding t-values can be found in Tables A15 and A16. * denotes significance at the 10-%, ** at the 5-% and *** at the 1-% level, using robust standard errors.

Electronic copy available at: https://ssrn.com/abstract=4260867

the full sample and β_2 and β_5 are significant at the 5%-level for the sub-sample with a low financial literacy score. For active savers only, trimming the sample along average savings adaptions causes nearly all coefficients to become insignificant.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A6: Estimated β_t-Coefficients (Treatment) - Trimmed at 99% of avg. savings BALANCES

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients			Active savers		
	Full sample	Financial literacy score < 4	$= 4$	Full sample	Financial literacy score < 4	$= 4$
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	250.06	157.44	347.91	418.44	254.96	665.11
	(0.39)	(0.18)	(0.41)	(0.35)	(0.17)	(0.37)
$D_i^{-11}T_i$	207.84	-183.66	848.86	346.01	-324.91	1,641.04
	(0.32)	(-0.21)	(1.05)	(0.29)	(-0.22)	(0.96)
$D_i^{-10}T_i$	193.17	-20.93	550.39	309.39	-51.53	1,024.06
	(0.30)	(-0.02)	(0.72)	(0.27)	(-0.03)	(0.63)
$D_i^{-9}T_i$	290.47	-153.15	929.35	498.91	-300.38	1,905.47
	(0.54)	(-0.21)	(1.45)	(0.51)	(-0.24)	(1.42)
$D_i^{-8}T_i$	152.42	-242.18	713.51	270.90	-437.71	1,486.41
	(0.29)	(-0.33)	(1.13)	(0.28)	(-0.35)	(1.11)
$D_i^{-7}T_i$	323.52	39.67	804.37	615.01	84.31	1,665.87
	(0.56)	(0.05)	(1.27)	(0.58)	(0.06)	(1.25)
$D_i^{-6}T_i$	460.55	520.07	312.51	826.69	892.74	628.43
	(0.88)	(0.71)	(0.54)	(0.87)	(0.70)	(0.52)
$D_i^{-5}T_i$	473.30	279.70	726.49	832.01	462.22	1,449.00
	(0.95)	(0.40)	(1.39)	(0.91)	(0.39)	(1.30)
$D_i^{-4}T_i$	190.23	117.82	215.68	283.51	167.57	384.90
	(0.42)	(0.18)	(0.55)	(0.35)	(0.15)	(0.45)
$D_i^{-3}T_i$	298.63	275.80	260.25	506.54	454.71	503.14
	(0.67)	(0.42)	(0.78)	(0.63)	(0.41)	(0.71)
$D_i^{-2}T_i$	-170.84	-400.27	180.30	-333.36	-710.13	353.71
	(-0.98)	(-1.76)	(0.64)	(-1.01)	(-1.77)	(0.60)
$D_i^{0}T_i$	1,015.54	1,212.39	780.58	1,961.00	2,160.42	1,675.38
	(1.76)	(1.31)	(1.35)	(1.75)	(1.31)	(1.34)
$D_i^{1}T_i$	687.92	1,399.67	-596.80	2,181.28	2,501.44	1,624.08
	(0.94)	(1.45)	(-0.42)	(1.86)	(1.46)	(1.26)
$D_i^{2}T_i$	806.62	2,019.33	-1,167.53	2,534.44	3,636.51	706.25
	(0.99)	(1.84)	(-0.74)	(1.99)	(1.87)	(0.61)
$D_i^{3}T_i$	965.31	2,618.26	-1,550.10	2,858.02	4,706.01	-131.96
	(0.98)	(1.77)	(-0.99)	(1.70)	(1.79)	(-0.12)
$D_i^{4}T_i$	906.26	2,719.95	-1,813.69	2,145.69	3,963.74	-810.65
	(1.01)	(2.10)	(-1.21)	(1.56)	(1.86)	(-0.73)
$D_i^{5}T_i$	1,402.36	3,492.43	-1,731.57	2,873.08	5,270.20	-1,169.11
	(1.59)	(2.60)	(-1.35)	(2.01)	(2.39)	(-1.12)
$D_i^{6}T_i$	1,285.25	2,909.14	-1,167.84	2,624.92	4,213.76	0.09
	(1.46)	(2.26)	(-0.85)	(1.86)	(2.01)	(0.00)
$D_i^{7}T_i$	1,235.50	2,992.08	-1,439.82	2,818.95	4,419.87	284.88
	(1.31)	(2.23)	(-0.91)	(1.90)	(2.00)	(0.19)
Constant	2,666.63	2,652.46	2,680.99	5,746.77	5,723.25	5,853.60
	(34.15)	(33.05)	(33.14)	(34.33)	(33.13)	(33.30)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	172,683	166,971	163,644	79,985	77,245	74,808

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period treatment effects for month t, where $t = 0$ is the month of the first questionnaire. In this table, we exclude individuals whose savings account balances before our intervention exceed the 99-% percentile (69,470.62 euros). Underlying standard errors are clustered at the individual level. Calculating the 99%-percentile, we only consider individuals in experimental groups with access to a savings account. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is in the treatment group and zero otherwise. The coefficients are estimated considering all clients in our data set (Columns 1-3) and active savers only (Columns 4-6). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 Ccolumns 3 and 6) present the estimation results for subjects with a financial literacy score below or equal to the median (above the median). The full samples of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=325 in Column 1/N=184 in Column 4), Treatment (N=418/N=214), and Zero-touch groups (N=8,008/N=3,714). The median splits result in the following balance between Control and Treatment groups (N in Control/N in Treatment) in different columns: (2): 219/236; (3): 106/182; (5): 128/132; (6): 56/82. For 99.43% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first questionnaire ($t = -1$).

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A7: Estimated β_t-Coefficients (Treatment) - Trimmed at 1% and 99% of avg. savings ADAPTATIONS

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients			Active savers		
	Full sample	Financial literacy score < 4	Financial literacy score $= 4$	Full sample	Financial literacy score < 4	Financial literacy score $= 4$
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	-146.61	-244.14	-53.46	-1,008.47	-1,429.64	-198.93
	(-0.26)	(-0.34)	(-0.07)	(-1.23)	(-1.62)	(-0.13)
$D_i^{-11}T_i$	-187.45	-604.00	478.63	-1,095.08	-2,071.94	837.62
	(-0.33)	(-0.82)	(0.66)	(-1.36)	(-2.40)	(0.55)
$D_i^{-10}T_i$	-213.29	-461.51	184.93	-1,120.05	-1,777.68	228.38
	(-0.38)	(-0.63)	(0.27)	(-1.43)	(-2.04)	(0.16)
$D_i^{-9}T_i$	-0.66	-408.91	580.29	-565.26	-1,483.32	1,155.67
	(-0.00)	(-0.60)	(1.05)	(-0.85)	(-1.87)	(1.02)
$D_i^{-8}T_i$	-124.43	-481.74	371.44	-743.35	-1,545.51	749.99
	(-0.25)	(-0.71)	(0.68)	(-1.09)	(-1.84)	(0.67)
$D_i^{-7}T_i$	75.91	-179.23	508.87	-605.68	-1,390.72	998.96
	(0.14)	(-0.23)	(0.90)	(-0.82)	(-1.53)	(0.86)
$D_i^{-6}T_i$	216.17	289.00	39.25	-287.98	-422.41	15.27
	(0.44)	(0.42)	(0.08)	(-0.49)	(-0.58)	(0.01)
$D_i^{-5}T_i$	374.76	316.72	445.67	-19.78	-408.67	814.26
	(0.77)	(0.45)	(1.01)	(-0.04)	(-0.58)	(0.88)
$D_i^{-4}T_i$	195.55	145.71	184.00	-369.01	-725.98	306.93
	(0.43)	(0.23)	(0.46)	(-0.81)	(-1.42)	(0.36)
$D_i^{-3}T_i$	308.79	297.42	250.17	-236.07	-615.07	476.25
	(0.68)	(0.46)	(0.75)	(-0.54)	(-1.14)	(0.67)
$D_i^{-2}T_i$	-171.50	-402.21	181.86	-327.11	-705.69	354.76
	(-0.98)	(-1.75)	(0.64)	(-0.97)	(-1.71)	(0.60)
$D_i^{0}T_i$	537.38	364.13	784.55	1,008.11	602.07	1,689.98
	(1.63)	(0.95)	(1.35)	(1.56)	(0.87)	(1.33)
$D_i^{1}T_i$	641.33	561.12	704.23	1,001.83	556.75	1,666.26
	(1.73)	(1.19)	(1.19)	(1.49)	(0.78)	(1.28)
$D_i^{2}T_i$	1,023.64	1,487.54	321.62	1,133.69	1,283.30	739.69
	(2.18)	(2.05)	(0.57)	(1.67)	(1.51)	(0.64)
$D_i^{3}T_i$	1,183.46	2,087.28	-56.29	668.16	1,069.56	-77.54
	(1.61)	(1.68)	(-0.10)	(1.00)	(1.28)	(-0.07)
$D_i^{4}T_i$	473.73	1,075.34	-383.28	512.82	1,241.59	-763.04
	(1.09)	(1.63)	(-0.70)	(0.74)	(1.37)	(-0.68)
$D_i^{5}T_i$	644.32	1,487.52	-533.17	409.40	1,300.81	-1,132.06
	(1.40)	(2.05)	(-1.00)	(0.61)	(1.44)	(-1.08)
$D_i^{6}T_i$	538.94	911.29	47.56	262.24	388.63	49.47
	(1.20)	(1.48)	(0.07)	(0.39)	(0.59)	(0.03)
$D_i^{7}T_i$	567.32	1,023.66	-31.40	208.10	194.18	328.93
	(1.09)	(1.36)	(-0.04)	(0.30)	(0.28)	(0.22)
Constant	3,898.48	3,926.40	3,967.17	7,953.68	8,008.08	8,213.94
	(86.74)	(85.28)	(86.18)	(96.41)	(94.98)	(94.76)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	173,783	168,111	164,804	80,765	78,045	75,688

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per-period treatment effects for month t, where $t = 0$ is the month of the first questionnaire. In this table, we exclude individuals whose average savings adaptations lie below the 1%-percentile (-37,908.1 Euros) or above the 99%-percentile (101,464 euros). Savings adaptations refer to the difference in average savings balances before and after our intervention, excluding periods during which our experiment took place. Calculating the percentiles, we only consider individuals in experimental groups with access to a savings account. Standard errors are clustered at the individual level. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable (Y_i, t). T_i equals 1 if individual i is in the treatment group and zero otherwise. The coefficients are estimated considering all clients in our data set (Columns 1-3) and active savers only (Columns 4-6). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 (Columns 3 and 6) present the estimation results for subjects with a financial literacy score below or equal to the median (above the median). The full samples of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=324 in Column 1/N=184 in Column 4), Treatment (N=414/N=211), and Zero-touch groups (N=8,008/N=3,714). The median splits result in the following number of observations (N Control/N Treatment) in different columns: (2): 219/233; (3): 105/181; (5): 128/130; (6): 56/81. For 99.44% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first questionnaire ($t = -1$).

Electronic copy available at: https://ssrn.com/abstract=4260867

E Full regression results tables

E.1 Main results

Table A8: Estimated β_t-Coefficients (Treatment) - base case

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients			Active savers		
	Full sample	Financial literacy score < 4	Financial literacy score = 4	Full sample	Financial literacy score < 4	Financial literacy score = 4
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	127.23	-11.61	327.56	208.20	-22.88	619.23
	(0.19)	(-0.01)	(0.39)	(0.17)	(-0.01)	(0.35)
$D_i^{-11}T_i$	99.63	-347.03	856.80	164.80	-588.94	1,656.33
	(0.15)	(-0.38)	(1.06)	(0.14)	(-0.38)	(0.98)
$D_i^{-10}T_i$	179.46	-123.98	681.24	303.50	-217.05	1,317.90
	(0.28)	(-0.14)	(0.89)	(0.26)	(-0.14)	(0.81)
$D_i^{-9}T_i$	263.98	-258.61	1,035.21	466.15	-472.29	2,136.26
	(0.48)	(-0.34)	(1.60)	(0.47)	(-0.37)	(1.58)
$D_i^{-8}T_i$	122.13	-353.51	818.58	229.85	-620.09	1,711.72
	(0.22)	(-0.47)	(1.28)	(0.23)	(-0.48)	(1.28)
$D_i^{-7}T_i$	276.69	-73.71	874.00	537.61	-104.63	1,815.55
	(0.47)	(-0.09)	(1.38)	(0.50)	(-0.07)	(1.37)
$D_i^{-6}T_i$	493.19	553.79	333.74	881.95	944.55	673.58
	(0.95)	(0.76)	(0.58)	(0.93)	(0.75)	(0.57)
$D_i^{-5}T_i$	499.35	304.58	747.65	875.76	500.47	1,492.33
	(1.00)	(0.44)	(1.44)	(0.97)	(0.42)	(1.36)
$D_i^{-4}T_i$	212.60	143.55	226.09	322.50	207.96	408.90
	(0.47)	(0.23)	(0.57)	(0.40)	(0.19)	(0.49)
$D_i^{-3}T_i$	314.36	291.54	270.78	532.77	477.40	525.88
	(0.70)	(0.45)	(0.82)	(0.67)	(0.43)	(0.75)
$D_i^{-2}T_i$	-164.13	-398.21	193.57	-318.81	-703.78	382.42
	(-0.95)	(-1.76)	(0.69)	(-0.97)	(-1.77)	(0.65)
$D_i^{0}T_i$	1,003.82	1,196.61	777.59	1,930.62	2,125.38	1,659.80
	(1.74)	(1.30)	(1.35)	(1.73)	(1.30)	(1.34)
$D_i^{1}T_i$	680.43	1,385.17	-599.27	2,152.59	2,467.08	1,607.99
	(0.93)	(1.44)	(-0.43)	(1.86)	(1.45)	(1.26)
$D_i^{2}T_i$	934.49	2,289.89	-1,302.10	2,730.63	4,083.35	403.48
	(1.13)	(2.06)	(-0.83)	(2.12)	(2.08)	(0.34)
$D_i^{3}T_i$	1,063.50	2,879.11	-1,736.77	2,996.65	5,134.72	-544.46
	(1.07)	(1.94)	(-1.10)	(1.77)	(1.95)	(-0.45)
$D_i^{4}T_i$	998.22	2,967.16	-1,993.79	2,279.32	4,374.59	-1,205.35
	(1.11)	(2.27)	(-1.32)	(1.63)	(2.05)	(-1.03)
$D_i^{5}T_i$	1,492.95	3,754.79	-1,939.23	2,999.45	5,699.67	-1,620.93
	(1.67)	(2.78)	(-1.49)	(2.07)	(2.58)	(-1.43)
$D_i^{6}T_i$	1,440.03	3,268.31	-1,376.29	2,866.44	4,813.73	-458.22
	(1.60)	(2.50)	(-0.99)	(1.98)	(2.26)	(-0.31)
$D_i^{7}T_i$	1,390.04	3,349.10	-1,647.01	3,056.57	5,013.16	-168.05
	(1.45)	(2.46)	(-1.04)	(2.02)	(2.24)	(-0.11)
Constant	4,434.54	4,468.28	4,516.12	9,421.46	9,501.06	9,713.72
	(47.89)	(46.88)	(46.84)	(48.08)	(46.97)	(47.00)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	174,963	169,231	165,864	82,265	79,505	77,028

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period treatment effects for month t, where $t = 0$ is the month of the first survey. Underlying standard errors are clustered at the individual level. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is in the treatment group and zero otherwise. The coefficients are estimated considering all clients in our data set (Columns 1-3) and active savers only (Columns 4-6). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 (Columns 3 and 6) present the estimation results for subjects with a financial literacy score below or equal to the median (above the median). The full samples of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=327 in Column 1/N=186 in Column 4), Treatment (N=420/N=216), and Zero-touch groups (N=8,008/N=3,714). The median splits result in the following numbers of observations (N in Control/N in Treatment) in different columns: (2): 221/237; (3): 106/183; (5): 130/133; (6): 56/83. For 99.67% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first questionnaire ($t = -1$). The estimates and t-statistics correspond to Figure 3.

Electronic copy available at: https://ssrn.com/abstract=4260867

E.2 Intention to treat analyses

Table A9: Estimated ITT and TOT effects—all clients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full sample			Financial literacy score < 4			Financial literacy score = 4		
	ITT β_t-Coef. (t-stat.)	1st stage Coef. (t-stat.)	TOT β_t-Coef. (t-stat.)	ITT β_t-Coef. (t-stat.)	1st stage Coef. (t-stat.)	TOT β_t-Coef. (t-stat.)	ITT β_t-Coef. (t-stat.)	1st stage Coef. (t-stat.)	TOT β_t-Coef. (t-stat.)
$\mathbb{1}$(assigned)		0.15			0.13			0.17	
		(195.15)			(174.86)			(191.45)	
$D_i^{-12}T_i$	-67.93		-467.44	-391.33		-2,951.76	462.19		2,783.36
	(-0.12)		(-0.10)	(-0.51)		(-0.52)	(0.75)		(0.73)
$D_i^{-11}T_i$	-213.68		-1,470.45	-648.69		-4,893.08	592.54		3,568.32
	(-0.38)		(-0.34)	(-0.82)		(-0.94)	(1.04)		(1.10)
$D_i^{-10}T_i$	-161.80		-1,113.44	-426.18		-3,214.70	327.47		1,972.02
	(-0.30)		(-0.27)	(-0.57)		(-0.64)	(0.62)		(0.68)
$D_i^{-9}T_i$	-87.62		-602.95	-317.21		-2,392.68	332.46		2,002.08
	(-0.18)		(-0.16)	(-0.46)		(-0.52)	(0.68)		(0.72)
$D_i^{-8}T_i$	-164.38		-1,131.20	-387.28		-2,921.26	239.88		1,444.57
	(-0.35)		(-0.30)	(-0.58)		(-0.67)	(0.50)		(0.56)
$D_i^{-7}T_i$	-222.42		-1,530.59	-410.69		-3,097.80	158.93		957.09
	(-0.41)		(-0.35)	(-0.54)		(-0.62)	(0.32)		(0.34)
$D_i^{-6}T_i$	114.83		790.18	192.96		1,455.49	-59.22		-356.64
	(0.25)		(0.23)	(0.30)		(0.36)	(-0.13)		(-0.14)
$D_i^{-5}T_i$	149.64		1,029.74	90.06		679.31	244.33		1,471.38
	(0.33)		(0.30)	(0.14)		(0.16)	(0.68)		(0.63)
$D_i^{-4}T_i$	112.95		777.29	275.85		2,080.75	-196.15		-1,181.25
	(0.26)		(0.25)	(0.45)		(0.55)	(-0.60)		(-0.61)
$D_i^{-3}T_i$	69.31		476.94	244.37		1,843.29	-257.99		-1,553.63
	(0.16)		(0.15)	(0.39)		(0.51)	(-0.93)		(-1.02)
$D_i^{-2}T_i$	-144.94		-997.37	-155.13		-1,170.13	-96.77		-582.76
	(-1.10)		(-1.07)	(-0.92)		(-0.90)	(-0.44)		(-0.48)
$D_i^{0}T_i$	139.38		959.17	-0.22		-1.64	379.59		2,285.91
	(0.76)		(0.76)	(-0.00)		(-0.00)	(1.12)		(1.20)
$D_i^{1}T_i$	-199.52		-1,373.02	108.74		820.23	-912.35		-5,494.25
	(-0.43)		(-0.45)	(0.47)		(0.42)	(-0.69)		(-0.76)
$D_i^{2}T_i$	-58.40		-401.88	405.04		3,055.21	-1,091.31		-6,571.93
	(-0.10)		(-0.11)	(1.14)		(1.03)	(-0.70)		(-0.76)
$D_i^{3}T_i$	50.78		349.46	436.97		3,296.04	-835.87		-5,033.65
	(0.09)		(0.10)	(1.12)		(1.06)	(-0.54)		(-0.60)
$D_i^{4}T_i$	68.86		473.83	417.89		3,152.14	-755.26		-4,548.23
	(0.13)		(0.13)	(1.13)		(1.05)	(-0.50)		(-0.56)
$D_i^{5}T_i$	573.65		3,947.55	1,044.46		7,878.36	-483.81		-2,913.55
	(1.07)		(1.13)	(2.16)		(2.45)	(-0.37)		(-0.40)
$D_i^{6}T_i$	602.62		4,146.94	1,003.90		7,572.44	-308.47		-1,857.64
	(1.08)		(1.13)	(1.94)		(2.38)	(-0.23)		(-0.23)
$D_i^{7}T_i$	284.11		1,955.10	743.53		5,608.46	-753.07		-4,535.05
	(0.46)		(0.51)	(1.38)		(1.22)	(-0.49)		(-0.51)
Constant	4,580.90		4,580.90	4,572.37		4,572.37	4,567.41		4,567.41
	(57.41)		(20.77)	(52.95)		(18.82)	(50.76)		(22.66)
Month FE	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
N	223,997	223,997	223,997	200,055	200,055	200,055	184,074	184,074	184,074

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period ITT and TOT effects for month t, where $t = 0$ is the month of the first questionnaire. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is assigned to the treatment group and zero otherwise. The coefficients are estimated only considering active savers. We show estimates for the full sample (Columns 1-3) and the low (high) financial literacy sub-samples. Columns 1, 4, and 7 show the per period ITT and Columns 3, 6, and 9 the TOT effects. TOT effects are estimated in a two-stage instrumental variable regression, re-weighting the ITT effects by the respective share of compliers. Columns 2, 5, and 8 show the estimates of the first stage regression, which is equal to the share of compliers in the respective sub-sample. For the TOT regressions, we used bootstrapped standard errors to account for serial correlation, while we use robust standard errors for ITT effects. We omit the month before the first questionnaire ($t = -1$). The estimates and t-statistics correspond to Panels a and c of Figure A2.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A10: Estimated ITT and TOT effects—active savers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full sample			Low literacy			High literacy		
	ITT β_t-Coef. (t-stat.)	1st stage Coef. (t-stat.)	TOT β_t-Coef. (t-stat.)	ITT β_t-Coef. (t-stat.)	1st stage Coef. (t-stat.)	TOT β_t-Coef. (t-stat.)	ITT β_t-Coef. (t-stat.)	1st stage Coef. (t-stat.)	TOT β_t-Coef. (t-stat.)
$\mathbb{1}$(assigned)		0.13			0.13			0.14	
		(129.03)			(119.55)			(117.14)	
$D_i^{-12}T_i$	-123.80		-947.32	-668.62		-5,231.25	814.45		6,006.59
	(-0.13)		(-0.12)	(-0.52)		(-0.49)	(0.72)		(0.76)
$D_i^{-11}T_i$	-375.50		-2,873.34	-1,095.56		-8,571.67	1,066.18		7,863.05
	(-0.39)		(-0.36)	(-0.83)		(-0.73)	(1.02)		(1.14)
$D_i^{-10}T_i$	-287.37		-2,198.97	-722.41		-5,652.11	583.53		4,303.53
	(-0.31)		(-0.29)	(-0.58)		(-0.52)	(0.60)		(0.64)
$D_i^{-9}T_i$	-157.92		-1,208.40	-542.65		-4,245.70	589.09		4,344.51
	(-0.19)		(-0.17)	(-0.47)		(-0.43)	(0.66)		(0.72)
$D_i^{-8}T_i$	-288.95		-2,211.03	-659.69		-5,161.44	427.79		3,154.93
	(-0.35)		(-0.32)	(-0.59)		(-0.55)	(0.48)		(0.50)
$D_i^{-7}T_i$	-387.82		-2,967.62	-693.55		-5,426.34	321.54		2,371.33
	(-0.41)		(-0.37)	(-0.54)		(-0.51)	(0.34)		(0.36)
$D_i^{-6}T_i$	203.10		1,554.12	320.92		2,510.91	-90.29		-665.87
	(0.25)		(0.22)	(0.29)		(0.31)	(-0.10)		(-0.11)
$D_i^{-5}T_i$	264.56		2,024.41	143.73		1,124.53	484.06		3,569.98
	(0.33)		(0.30)	(0.13)		(0.14)	(0.73)		(0.66)
$D_i^{-4}T_i$	200.12		1,531.31	462.17		3,616.04	-330.56		-2,437.88
	(0.27)		(0.25)	(0.44)		(0.49)	(-0.56)		(-0.49)
$D_i^{-3}T_i$	123.29		943.44	409.50		3,203.94	-447.38		-3,299.40
	(0.16)		(0.16)	(0.39)		(0.44)	(-0.87)		(-0.86)
$D_i^{-2}T_i$	-254.22		-1,945.29	-265.57		-2,077.84	-163.03		-1,202.36
	(-1.10)		(-1.12)	(-0.92)		(-0.89)	(-0.40)		(-0.39)
$D_i^{0}T_i$	227.26		1,739.01	-9.48		-74.17	666.93		4,918.61
	(0.71)		(0.56)	(-0.03)		(-0.04)	(1.07)		(1.02)
$D_i^{1}T_i$	292.84		2,240.79	156.72		1,226.15	491.08		3,621.73
	(0.90)		(0.72)	(0.39)		(0.55)	(0.90)		(0.81)
$D_i^{2}T_i$	550.46		4,212.14	672.84		5,264.32	205.49		1,515.46
	(1.11)		(1.05)	(1.11)		(1.04)	(0.23)		(0.25)
$D_i^{3}T_i$	765.28		5,855.98	652.90		5,108.31	859.92		6,341.94
	(1.42)		(1.38)	(0.99)		(0.91)	(0.90)		(0.86)
$D_i^{4}T_i$	631.15		4,829.61	499.66		3,909.37	747.45		5,512.42
	(1.21)		(1.21)	(0.81)		(0.83)	(0.77)		(0.81)
$D_i^{5}T_i$	1,384.22		10,592.09	1,559.55		12,201.94	834.70		6,155.89
	(2.13)		(1.79)	(1.92)		(2.15)	(0.79)		(0.83)
$D_i^{6}T_i$	1,439.08		11,011.85	1,492.42		11,676.70	1,174.62		8,662.86
	(2.09)		(1.92)	(1.71)		(2.01)	(1.10)		(1.18)
$D_i^{7}T_i$	1,129.05		8,639.51	1,021.60		7,992.97	1,236.69		9,120.57
	(1.60)		(1.50)	(1.12)		(1.20)	(1.16)		(1.26)
Constant	9,257.48		9,257.48	9,370.56		9,370.56	9,600.41		9,600.41
	(57.65)		(24.27)	(53.04)		(21.55)	(50.98)		(18.90)
Month fixed effects	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
N	110,749	110,749	110,749	97,534	97,534	97,534	87,483	87,483	87,483

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period ITT and TOT effects for month t, where $t = 0$ is the month of the first questionnaire. All estimations include time and individual fixed effects and use the monthly saving balance in Euro as dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is assigned to the treatment group and zero otherwise. The coefficients are estimated only considering active savers. We show estimates for the full sample (Column 1-3) and the low (high) financial literacy sub-samples. Column 1, 4 and 7 show the per period ITT and column 3, 6 and 9 the TOT effects. TOT effects are estimated in a two-stage instrumental variable regression, reweighting the ITT effects by the respective share of compliers. Column 2, 5 and 8 show the estimates of the first stage regression, which is equal to the share of compliers in the respective sub-sample. For the TOT regressions, we used bootstrapped standard errors to account for serial correlation, while we use robust standard errors for ITT effects. We omit the month before the first questionnaire ($t = -1$). The estimates and t-statistics correspond Panel a and c of Figure A2.

Electronic copy available at: https://ssrn.com/abstract=4260867

E.3 Robustness checks

Table A11: Estimated β_t-Coefficients (Treatment)—wealth as dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients			Active savers		
	Full sample	Financial literacy score < 4	Financial literacy score $= 4$	Full sample	Financial literacy score < 4	Financial literacy score $= 4$
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	-1,262.68	-511.70	-3,436.32	-1,119.87	-1,837.22	-26.76
	(-0.72)	(-0.25)	(-0.97)	(-0.48)	(-0.57)	(-0.01)
$D_i^{-11}T_i$	-443.63	-723.37	-438.28	-999.01	-2,120.78	945.00
	(-0.31)	(-0.35)	(-0.28)	(-0.44)	(-0.66)	(0.34)
$D_i^{-10}T_i$	-1,357.14	-1,948.85	-805.67	-1,748.62	-3,705.43	1,959.58
	(-0.87)	(-0.84)	(-0.54)	(-0.68)	(-1.01)	(0.84)
$D_i^{-9}T_i$	-914.77	-1,546.43	-371.78	-1,892.41	-3,720.16	1,318.20
	(-0.63)	(-0.71)	(-0.30)	(-0.79)	(-1.09)	(0.67)
$D_i^{-8}T_i$	-694.45	-840.24	-1,194.42	-1,233.79	-2,364.88	294.64
	(-0.62)	(-0.51)	(-0.88)	(-0.69)	(-0.92)	(0.17)
$D_i^{-7}T_i$	-640.75	-627.31	-1,047.96	-1,186.48	-1,651.96	-533.77
	(-0.54)	(-0.36)	(-0.96)	(-0.64)	(-0.63)	(-0.27)
$D_i^{-6}T_i$	-19.77	9.87	-381.80	-233.11	-697.96	302.39
	(-0.02)	(0.01)	(-0.41)	(-0.14)	(-0.29)	(0.19)
$D_i^{-5}T_i$	-720.24	-1,034.29	-581.81	-1,371.64	-2,338.72	36.11
	(-0.77)	(-0.75)	(-0.66)	(-0.88)	(-1.05)	(0.02)
$D_i^{-4}T_i$	-332.73	-457.43	-496.60	-723.31	-992.03	-588.25
	(-0.37)	(-0.34)	(-0.62)	(-0.47)	(-0.45)	(-0.44)
$D_i^{-3}T_i$	-518.76	-873.65	-126.04	-241.51	-381.20	-30.86
	(-0.69)	(-0.77)	(-0.18)	(-0.21)	(-0.23)	(-0.03)
$D_i^{-2}T_i$	-818.42	-759.28	-1,119.71	-763.24	-630.85	-1,311.53
	(-1.42)	(-0.89)	(-1.61)	(-0.86)	(-0.50)	(-1.11)
$D_i^{0}T_i$	432.97	-165.21	954.16	279.38	-794.51	1,652.95
	(0.88)	(-0.29)	(1.09)	(0.34)	(-0.88)	(1.04)
$D_i^{1}T_i$	-595.28	-8.14	-2,776.29	856.23	-250.96	1,903.24
	(-0.43)	(-0.01)	(-0.71)	(0.81)	(-0.26)	(0.84)
$D_i^{2}T_i$	-204.57	918.21	-3,138.96	1,210.55	725.40	1,370.62
	(-0.13)	(0.79)	(-0.74)	(0.83)	(0.40)	(0.55)
$D_i^{3}T_i$	1,261.35	3,031.86	-2,513.08	4,205.00	4,999.57	2,337.67
	(0.74)	(2.05)	(-0.57)	(2.35)	(2.08)	(0.89)
$D_i^{4}T_i$	1,017.89	3,485.52	-3,800.75	3,270.29	4,891.35	-338.75
	(0.57)	(2.15)	(-0.86)	(1.76)	(2.00)	(-0.12)
$D_i^{5}T_i$	1,246.48	4,057.09	-4,261.69	3,355.88	5,127.77	-633.86
	(0.70)	(2.42)	(-0.97)	(1.71)	(1.97)	(-0.22)
$D_i^{6}T_i$	1,892.72	3,520.35	-1,638.65	4,263.21	5,454.50	1,681.63
	(1.03)	(1.98)	(-0.37)	(2.11)	(1.96)	(0.63)
$D_i^{7}T_i$	1,248.29	3,412.33	-3,227.17	3,530.52	4,517.09	1,242.78
	(0.66)	(1.87)	(-0.70)	(1.66)	(1.55)	(0.43)
Constant	22,227.65	22,042.68	22,056.49	36,200.91	36,018.22	36,419.64
	(131.43)	(127.11)	(124.80)	(124.75)	(120.35)	(118.96)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	174,963	169,231	165,864	82,265	79,505	77,028

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period treatment effects for month t, where $t = 0$ is the month of the first survey. The coefficients are estimated using wealth as dependent variable ($Y_{i,t}$). Underlying standard errors are clustered at the individual level. All estimations include time and individual fixed effects. T_i equals 1 if individual i is in the treatment group and zero otherwise. Column 1-3 show the estimates considering all clients, while Columns 4-6 present the estimation results only considering active savers. Column 1 and 4 show the estimates for the full sample of the respective group, while column 2 and 5 (column 3 and 6) present the estimation results for subjects with a financial literacy score below or equal to the median (above the median). The full samples of all subjects (column 1) and only active savers (column 4) include monthly panel data on individuals in the Control (N=327 in column 1/N=186 in column 4), Treatment (N=420/N=216) and Zero-touch group (N=8,008/N=3,714). The median splits result in the following balance between Control and Treatment group (N in Control/N in Treatment) in the different columns: (2): 221/237; (3): 106/183; (5): 130/133; (6): 56/83. For 99.67% of the subjects we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first questionnaire ($t = -1$). The estimates and t-statistics correspond Panel a and d of Figure A3.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A12: Estimated β_t-Coefficients (Treatment)—net wealth and sum of savings and portfolio accounts as dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
	Net wealth			Savings and portfolio acc.		
	Full sample	Financial literacy score		Full sample	Financial literacy score	
		< 4	$= 4$		< 4	$= 4$
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	313.64	647.51	-734.14	-434.97	-433.09	-448.31
	(0.15)	(0.22)	(-0.30)	(-0.38)	(-0.28)	(-0.28)
$D_i^{-11}T_i$	-183.81	403.40	-1,481.41	-462.17	-588.37	-243.53
	(-0.09)	(0.14)	(-0.62)	(-0.40)	(-0.37)	(-0.15)
$D_i^{-10}T_i$	-148.89	116.64	-926.28	55.00	-3.77	271.13
	(-0.07)	(0.04)	(-0.42)	(0.05)	(-0.00)	(0.20)
$D_i^{-9}T_i$	-62.23	176.36	-854.20	267.13	-298.48	1,154.91
	(-0.03)	(0.06)	(-0.45)	(0.28)	(-0.22)	(1.01)
$D_i^{-8}T_i$	-566.84	-782.80	-952.40	-228.55	-472.88	48.02
	(-0.36)	(-0.39)	(-0.40)	(-0.28)	(-0.40)	(0.06)
$D_i^{-7}T_i$	986.40	-267.35	2,192.62	190.89	428.50	-221.66
	(0.50)	(-0.14)	(0.60)	(0.21)	(0.34)	(-0.23)
$D_i^{-6}T_i$	-191.71	-181.67	-631.89	283.89	219.80	242.33
	(-0.14)	(-0.11)	(-0.32)	(0.42)	(0.23)	(0.33)
$D_i^{-5}T_i$	-682.73	-922.04	-796.95	296.24	15.17	575.65
	(-0.53)	(-0.59)	(-0.41)	(0.48)	(0.02)	(0.87)
$D_i^{-4}T_i$	280.48	-434.95	755.00	-102.22	-185.09	-37.88
	(0.24)	(-0.30)	(0.45)	(-0.19)	(-0.25)	(-0.07)
$D_i^{-3}T_i$	-312.14	-1,054.50	521.39	5.04	66.01	-166.91
	(-0.30)	(-0.87)	(0.30)	(0.01)	(0.09)	(-0.33)
$D_i^{-2}T_i$	-850.92	-822.11	-1,160.13	-355.22	-520.72	-97.27
	(-1.36)	(-0.93)	(-1.30)	(-1.27)	(-1.44)	(-0.23)
$D_i^{0}T_i$	460.78	-611.58	1,709.85	575.97	497.08	622.93
	(0.80)	(-0.99)	(1.62)	(1.07)	(0.62)	(0.91)
$D_i^{1}T_i$	-368.67	-181.15	-1,995.33	-707.94	511.87	-3,398.57
	(-0.26)	(-0.26)	(-0.51)	(-0.52)	(0.57)	(-0.89)
$D_i^{2}T_i$	434.09	2,447.23	-3,932.85	-399.76	1,156.02	-3,524.97
	(0.23)	(1.43)	(-0.89)	(-0.26)	(0.90)	(-0.85)
$D_i^{3}T_i$	1,891.90	4,455.65	-3,098.82	18.76	1,675.66	-3,353.46
	(0.95)	(2.30)	(-0.68)	(0.01)	(1.28)	(-0.77)
$D_i^{4}T_i$	2,384.75	5,728.60	-3,855.94	931.51	3,347.36	-3,477.92
	(1.06)	(2.28)	(-0.83)	(0.53)	(2.00)	(-0.80)
$D_i^{5}T_i$	2,665.14	5,943.52	-3,407.61	1,572.96	4,244.04	-3,220.02
	(1.17)	(2.32)	(-0.74)	(0.89)	(2.40)	(-0.75)
$D_i^{6}T_i$	4,065.05	6,005.71	263.82	2,025.87	4,080.69	-1,777.71
	(1.69)	(2.22)	(0.05)	(1.13)	(2.25)	(-0.41)
$D_i^{7}T_i$	3,519.69	6,120.64	-1,487.16	2,138.01	4,061.38	-1,411.22
	(1.46)	(2.28)	(-0.30)	(1.16)	(2.26)	(-0.31)
Constant	2,393.94	2,100.51	2,010.80	14,697.46	14,403.91	14,476.30
	(9.49)	(8.10)	(7.61)	(119.32)	(114.64)	(112.67)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	174,963	169,231	165,864	174,963	169,231	165,864

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period treatment effects for month t, where $t = 0$ is the month of the first survey. Underlying standard errors are clustered at the individual level. All estimations include time and individual fixed effects. T_i equals 1 if individual i is in the treatment group and zero otherwise. The coefficients in Columns 1-3 (Columns 4-6) are estimated using net wealth (sum of savings and portfolio accounts) in euros as the dependent variable ($Y_{i,t}$). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 (Columns 3 and 6) present the estimation results for subjects with a financial literacy score below or equal to the median (above the median). The full samples of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=327 in Column 1/N=186 in Column 4), Treatment (N=420/N=216), and Zero Touch groups (N=8,008/N=3,714). The median splits result in the following balance between Control and Treatment groups (N in Control/N in Treatment) in different columns: (2): 221/237; (3): 106/183; (5): 130/133; (6): 56/83. For 99.67% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first survey ($t = -1$). The estimates and t-statistics correspond to Panels b and c of Figure A3.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A13: Estimated β_t-Coefficients (Treatment) - subjective financial literacy

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients			Active savers		
	Full sample	Sub. financial literacy ≤ 5	Sub. financial literacy > 5	Full sample	Sub. financial literacy ≤ 5	Sub. financial literacy > 5
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	127.23	-280.00	615.35	208.20	-524.23	1,079.04
	(0.19)	(-0.56)	(0.45)	(0.17)	(-0.58)	(0.43)
$D_i^{-11}T_i$	99.63	-4.31	209.58	164.80	-21.89	379.75
	(0.15)	(-0.01)	(0.16)	(0.14)	(-0.02)	(0.15)
$D_i^{-10}T_i$	179.46	-0.73	382.01	303.50	-25.86	697.32
	(0.28)	(-0.00)	(0.28)	(0.26)	(-0.03)	(0.29)
$D_i^{-9}T_i$	263.98	-50.75	635.38	466.15	-111.59	1,159.50
	(0.48)	(-0.12)	(0.57)	(0.47)	(-0.14)	(0.58)
$D_i^{-8}T_i$	122.13	-285.14	603.82	229.85	-540.35	1,160.75
	(0.22)	(-0.65)	(0.55)	(0.23)	(-0.66)	(0.59)
$D_i^{-7}T_i$	276.69	-132.30	750.40	537.61	-253.97	1,496.88
	(0.47)	(-0.31)	(0.62)	(0.50)	(-0.32)	(0.70)
$D_i^{-6}T_i$	493.19	-74.55	1,172.71	881.95	-175.75	2,152.30
	(0.95)	(-0.21)	(1.09)	(0.93)	(-0.27)	(1.12)
$D_i^{-5}T_i$	499.35	183.86	879.48	875.76	307.27	1,557.96
	(1.00)	(0.59)	(0.84)	(0.97)	(0.52)	(0.84)
$D_i^{-4}T_i$	212.60	-125.00	634.42	322.50	-265.75	1,023.72
	(0.47)	(-0.48)	(0.66)	(0.40)	(-0.54)	(0.61)
$D_i^{-3}T_i$	314.36	-66.33	780.14	532.77	-153.41	1,353.89
	(0.70)	(-0.28)	(0.81)	(0.67)	(-0.34)	(0.81)
$D_i^{-2}T_i$	-164.13	-347.53	46.94	-318.81	-673.83	110.08
	(-0.95)	(-1.77)	(0.16)	(-0.97)	(-1.82)	(0.20)
$D_i^{0}T_i$	1,003.82	719.84	1,343.32	1,930.62	1,374.02	2,602.04
	(1.74)	(1.32)	(1.25)	(1.73)	(1.32)	(1.24)
$D_i^{1}T_i$	680.43	711.58	612.00	2,152.59	1,379.87	3,084.03
	(0.93)	(1.28)	(0.41)	(1.86)	(1.30)	(1.40)
$D_i^{2}T_i$	934.49	1,176.93	591.09	2,730.63	2,251.99	3,311.17
	(1.13)	(1.75)	(0.36)	(2.12)	(1.76)	(1.38)
$D_i^{3}T_i$	1,063.50	1,092.86	964.06	2,996.65	2,095.81	4,083.20
	(1.07)	(1.60)	(0.47)	(1.77)	(1.62)	(1.21)
$D_i^{4}T_i$	998.22	1,754.23	54.00	2,279.32	2,361.28	2,184.22
	(1.11)	(1.98)	(0.03)	(1.63)	(1.74)	(0.84)
$D_i^{5}T_i$	1,492.95	2,137.92	664.89	2,999.45	3,021.15	2,983.76
	(1.67)	(2.24)	(0.41)	(2.07)	(2.02)	(1.13)
$D_i^{6}T_i$	1,440.03	1,873.96	837.93	2,866.44	2,485.29	3,328.36
	(1.60)	(2.01)	(0.52)	(1.98)	(1.73)	(1.25)
$D_i^{7}T_i$	1,390.04	1,839.95	774.60	3,056.57	2,716.76	3,481.71
	(1.45)	(1.95)	(0.44)	(2.02)	(1.92)	(1.22)
Constant	4,434.54	4,470.78	4,513.42	9,421.46	9,557.24	9,654.99
	(47.89)	(47.10)	(46.64)	(48.08)	(47.19)	(46.80)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	174,963	168,287	166,808	82,265	78,638	77,895

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period treatment effects for month t, where $t = 0$ is the month of the first survey. Underlying standard errors are clustered at the individual level. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is in the treatment group and zero otherwise. The coefficients are estimated considering all subjects in our data set (Columns 1-3) and active savers only (Columns 4-6). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 (Columns 3 and 6) present the estimation results for subjects with a self-indicated subjective literacy below or equal to the median (above the median). The full samples of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=327 in Column 1/N=186 in Column 4), Treatment (N=420/N=216), and Zero-touch groups (N=8,008/N=3,714). The median splits result in the following number of observations (N in Control/N in Treatment) in the different columns: (2): 183/227; (3): 144/193; (5): 101/118; (6): 85/98. For 99.67% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first survey ($t = -1$). The estimates and t-statistics correspond to Panels a and b of Figure A4.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A14: Estimated β_t-Coefficients (ITT) - subjective financial literacy

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients			Active savers		
	Full sample	Sub. financial literacy ≤ 5	Sub. financial literacy > 5	Full sample	Sub. financial literacy ≤ 5	Sub. financial literacy > 5
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	-67.93	-486.95	522.35	-123.80	-804.25	887.48
	(-0.12)	(-0.98)	(0.47)	(-0.13)	(-0.92)	(0.47)
$D_i^{-11}T_i$	-213.68	-357.59	19.57	-375.50	-572.46	27.44
	(-0.38)	(-0.72)	(0.02)	(-0.39)	(-0.66)	(0.01)
$D_i^{-10}T_i$	-161.80	-180.58	-114.15	-287.37	-270.98	-229.91
	(-0.30)	(-0.45)	(-0.10)	(-0.31)	(-0.39)	(-0.12)
$D_i^{-9}T_i$	-87.62	-311.23	240.99	-157.92	-500.21	399.87
	(-0.18)	(-0.81)	(0.24)	(-0.19)	(-0.74)	(0.23)
$D_i^{-8}T_i$	-164.38	-365.23	127.45	-288.95	-609.51	219.30
	(-0.35)	(-0.99)	(0.13)	(-0.35)	(-0.94)	(0.13)
$D_i^{-7}T_i$	-222.42	-263.82	-152.65	-387.82	-432.40	-268.51
	(-0.41)	(-0.69)	(-0.14)	(-0.41)	(-0.64)	(-0.14)
$D_i^{-6}T_i$	114.83	-57.89	343.57	203.10	-64.82	547.62
	(0.25)	(-0.19)	(0.35)	(0.25)	(-0.12)	(0.33)
$D_i^{-5}T_i$	149.64	92.15	215.42	264.56	204.25	301.87
	(0.33)	(0.38)	(0.22)	(0.33)	(0.49)	(0.18)
$D_i^{-4}T_i$	112.95	74.80	118.84	200.12	153.01	95.26
	(0.26)	(0.38)	(0.13)	(0.27)	(0.45)	(0.06)
$D_i^{-3}T_i$	69.31	7.66	123.11	123.29	39.64	126.87
	(0.16)	(0.05)	(0.13)	(0.16)	(0.14)	(0.08)
$D_i^{-2}T_i$	-144.94	-184.88	-77.21	-254.22	-308.19	-132.79
	(-1.10)	(-1.44)	(-0.30)	(-1.10)	(-1.38)	(-0.29)
$D_i^{0}T_i$	139.38	99.38	191.83	227.26	149.98	326.13
	(0.76)	(0.61)	(0.50)	(0.71)	(0.52)	(0.47)
$D_i^{1}T_i$	-199.52	120.42	-607.65	292.84	66.97	577.24
	(-0.43)	(0.81)	(-0.59)	(0.90)	(0.28)	(0.79)
$D_i^{2}T_i$	-58.40	379.50	-581.05	550.46	554.29	651.21
	(-0.10)	(1.14)	(-0.48)	(1.11)	(0.95)	(0.71)
$D_i^{3}T_i$	50.78	533.37	-536.92	765.28	730.21	940.43
	(0.09)	(1.49)	(-0.44)	(1.42)	(1.17)	(0.93)
$D_i^{4}T_i$	68.86	564.48	-544.68	631.15	624.54	732.92
	(0.13)	(1.61)	(-0.47)	(1.21)	(1.05)	(0.75)
$D_i^{5}T_i$	573.65	1,153.06	-133.23	1,384.22	1,697.18	1,150.97
	(1.07)	(2.15)	(-0.13)	(2.13)	(1.80)	(1.20)
$D_i^{6}T_i$	602.62	1,292.59	-241.19	1,439.08	1,968.46	968.35
	(1.08)	(2.23)	(-0.23)	(2.09)	(1.93)	(1.00)
$D_i^{7}T_i$	284.11	967.89	-541.46	1,129.05	1,675.51	665.14
	(0.46)	(1.55)	(-0.47)	(1.60)	(1.59)	(0.70)
Constant	4,580.90	4,435.39	4,712.99	9,257.48	9,093.64	9,898.87
	(57.41)	(53.30)	(50.54)	(57.65)	(53.47)	(50.69)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	223,997	197,854	186,275	110,749	96,413	88,604

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the intention to treat (ITT) effects for month t, where $t = 0$ is the month of the first survey. Underlying standard errors are clustered at the individual level. All estimations include time and individual fixed effects and use the monthly savings balance in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is assigned to the treatment group and zero otherwise. The coefficients are estimated considering all subjects in our data set (Columns 1-3) and active savers only (Columns 4-6). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 (Columns 3 and 6) present the estimation results for subjects with a self-indicated subjective literacy below or equal to the median (above the median). The full sample of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=327 in Column 1/N=186 in Column 4), assigned-to-treat (N=2,880/N=1,642), and Zero-touch groups (N=8,008/N=3,714). The median splits result in the following number of observations (N in Control/N in assigned-to-treat) in the different columns: (2): 183/1,710; (3): 144/1,170; (5): 101/1,008; (6): 85/634. For 99.44% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first survey ($k = -1$). The estimates and t-statistics correspond to Panels c and d of Figure A4.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A15: Estimated β_t-Coefficients (Treatment) - Winsorized at 1%-99%

	(1)	(2)	(3)	(4)	(5)	(6)
	All subjects			Only active savers		
	Full sample	Financial literacy score < 4	$= 4$	Full sample	Financial literacy score < 4	$= 4$
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	10.03	-156.70	249.93	220.06	-6.06	619.31
	(0.02)	(-0.22)	(0.31)	(0.18)	(-0.00)	(0.35)
$D_i^{-11}T_i$	-15.70	-498.34	792.50	171.50	-580.34	1,656.41
	(-0.03)	(-0.69)	(1.00)	(0.14)	(-0.37)	(0.98)
$D_i^{-10}T_i$	-24.69	-353.39	533.89	262.36	-208.45	1,192.01
	(-0.04)	(-0.49)	(0.70)	(0.22)	(-0.14)	(0.74)
$D_i^{-9}T_i$	135.30	-368.76	901.17	446.89	-465.69	2,069.72
	(0.28)	(-0.58)	(1.41)	(0.45)	(-0.36)	(1.54)
$D_i^{-8}T_i$	-5.10	-465.42	694.55	214.35	-615.57	1,662.01
	(-0.01)	(-0.73)	(1.10)	(0.22)	(-0.48)	(1.25)
$D_i^{-7}T_i$	166.95	-187.45	796.75	540.26	-102.31	1,815.55
	(0.32)	(-0.27)	(1.26)	(0.51)	(-0.07)	(1.37)
$D_i^{-6}T_i$	360.66	374.26	307.09	881.95	944.55	673.58
	(0.82)	(0.61)	(0.54)	(0.93)	(0.75)	(0.57)
$D_i^{-5}T_i$	367.15	125.55	721.10	875.76	500.47	1,492.33
	(0.89)	(0.23)	(1.39)	(0.97)	(0.42)	(1.36)
$D_i^{-4}T_i$	80.96	-39.75	206.38	322.51	207.96	408.90
	(0.23)	(-0.08)	(0.52)	(0.40)	(0.19)	(0.49)
$D_i^{-3}T_i$	177.20	103.60	244.38	532.77	477.40	525.88
	(0.51)	(0.21)	(0.74)	(0.67)	(0.43)	(0.75)
$D_i^{-2}T_i$	-171.31	-397.97	175.89	-318.81	-703.78	382.42
	(-0.99)	(-1.76)	(0.63)	(-0.97)	(-1.77)	(0.65)
$D_i^{0}T_i$	733.58	710.55	790.42	1,652.59	1,673.82	1,659.81
	(1.92)	(1.36)	(1.38)	(1.84)	(1.35)	(1.34)
$D_i^{1}T_i$	554.23	902.96	-150.74	1,862.83	1,996.49	1,607.99
	(1.10)	(1.53)	(-0.15)	(1.97)	(1.52)	(1.26)
$D_i^{2}T_i$	875.71	1,786.35	-628.06	2,466.38	3,654.19	403.48
	(1.48)	(2.22)	(-0.59)	(2.20)	(2.20)	(0.34)
$D_i^{3}T_i$	603.89	1,670.29	-1,072.34	2,241.20	3,907.80	-544.44
	(1.02)	(2.08)	(-1.01)	(1.80)	(2.08)	(-0.45)
$D_i^{4}T_i$	746.94	2,164.29	-1,391.79	2,054.30	4,009.13	-1,205.30
	(1.16)	(2.34)	(-1.32)	(1.63)	(2.11)	(-1.03)
$D_i^{5}T_i$	1,195.43	3,002.09	-1,567.23	2,756.26	5,304.67	-1,620.87
	(1.73)	(2.96)	(-1.49)	(2.11)	(2.69)	(-1.43)
$D_i^{6}T_i$	1,128.74	2,491.74	-1,001.21	2,589.44	4,363.80	-458.13
	(1.65)	(2.64)	(-0.89)	(2.01)	(2.36)	(-0.31)
$D_i^{7}T_i$	1,058.16	2,422.12	-1,072.66	2,753.12	4,520.31	-168.02
	(1.51)	(2.51)	(-0.92)	(2.04)	(2.32)	(-0.11)
Constant	3,570.40	3,577.09	3,611.48	8,252.53	8,291.57	8,465.40
	(99.40)	(98.51)	(99.67)	(86.36)	(84.77)	(86.64)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	174,963	169,231	165,864	82,265	79,505	77,028

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period treatment effects for month t, where $t = 0$ is the month of the first survey. Underlying standard errors are clustered at the individual level. All estimations include time and individual fixed effects and use the monthly savings balance, winsorized at the 1% and 99%-percentiles of the respective month, in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is in the treatment group and zero otherwise. The coefficients are estimated considering all subjects in our data set (Columns 1-3) and active savers only (Columns 4-6). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 (Columns 3 and 6) present the estimation results for subjects with a financial literacy score below or equal to the median (above the median). The full samples of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=327 in column 1/N=186 in Column 4), Treatment (N=420/N=216), and Zero-touch groups (N=8,008/N=3,714). The median splits result in the following number of observations (N in Control/N in Treatment) in different columns: (2): 221/237; (3): 106/183; (5): 130/133; (6): 56/83. For 99.67% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first survey ($t = -1$). The estimates and t-statistics correspond to Panels a and b of Figure A5.

Electronic copy available at: https://ssrn.com/abstract=4260867

Table A16: Estimated β_t-Coefficients (Treatment) - Winsorized at 5%-95%

	(1)	(2)	(3)	(4)	(5)	(6)
	All clients			Active savers		
	Full sample	Financial literacy score < 4	Financial literacy score $= 4$	Full sample	Financial literacy score < 4	Financial literacy score $= 4$
	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)	β_t-Coef. (t-statistics)
$D_i^{-12}T_i$	-206.73	-467.96	236.18	-487.71	-640.76	-185.40
	(-0.85)	(-1.66)	(0.51)	(-0.71)	(-0.85)	(-0.14)
$D_i^{-11}T_i$	-178.97	-610.33	563.88	-504.13	-1,216.51	938.48
	(-0.74)	(-2.30)	(1.15)	(-0.73)	(-1.62)	(0.70)
$D_i^{-10}T_i$	-168.79	-445.75	317.99	-468.61	-923.31	473.18
	(-0.72)	(-1.68)	(0.70)	(-0.72)	(-1.28)	(0.37)
$D_i^{-9}T_i$	-45.49	-441.13	594.87	-132.50	-937.76	1,367.30
	(-0.20)	(-1.65)	(1.36)	(-0.21)	(-1.31)	(1.18)
$D_i^{-8}T_i$	-140.99	-484.16	414.23	-325.82	-1,022.73	957.63
	(-0.59)	(-1.63)	(0.98)	(-0.51)	(-1.34)	(0.83)
$D_i^{-7}T_i$	81.34	-206.18	601.02	138.58	-383.39	1,234.78
	(0.33)	(-0.69)	(1.34)	(0.20)	(-0.47)	(1.04)
$D_i^{-6}T_i$	96.20	39.01	195.74	183.53	119.84	327.43
	(0.42)	(0.14)	(0.49)	(0.29)	(0.15)	(0.30)
$D_i^{-5}T_i$	181.28	-4.34	502.53	311.38	-105.70	1,137.67
	(0.84)	(-0.02)	(1.42)	(0.52)	(-0.14)	(1.17)
$D_i^{-4}T_i$	-25.36	-179.51	204.45	-149.43	-395.10	289.17
	(-0.14)	(-0.81)	(0.69)	(-0.31)	(-0.70)	(0.36)
$D_i^{-3}T_i$	6.41	-99.59	175.53	66.41	-83.67	342.57
	(0.04)	(-0.43)	(0.69)	(0.14)	(-0.14)	(0.49)
$D_i^{-2}T_i$	-41.26	-145.65	116.50	-306.86	-623.09	279.39
	(-0.37)	(-1.05)	(0.55)	(-0.98)	(-1.71)	(0.48)
$D_i^{0}T_i$	223.71	174.32	306.90	772.83	636.86	1,027.82
	(1.56)	(0.90)	(1.29)	(1.80)	(1.25)	(1.30)
$D_i^{1}T_i$	85.55	142.93	-86.85	799.92	674.64	959.00
	(0.50)	(0.67)	(-0.28)	(1.69)	(1.22)	(1.13)
$D_i^{2}T_i$	202.23	299.73	5.22	1,050.59	1,345.46	479.12
	(0.94)	(1.17)	(0.01)	(1.78)	(1.90)	(0.43)
$D_i^{3}T_i$	34.74	165.22	-173.34	615.84	1,096.18	-210.21
	(0.16)	(0.62)	(-0.41)	(1.07)	(1.58)	(-0.19)
$D_i^{4}T_i$	96.07	293.84	-203.26	592.71	1,272.93	-567.35
	(0.40)	(0.97)	(-0.46)	(0.97)	(1.65)	(-0.52)
$D_i^{5}T_i$	271.48	548.50	-137.32	944.92	2,006.56	-917.35
	(1.13)	(1.75)	(-0.32)	(1.47)	(2.35)	(-0.90)
$D_i^{6}T_i$	213.60	500.76	-186.35	926.37	1,686.72	-361.70
	(0.87)	(1.61)	(-0.41)	(1.40)	(1.97)	(-0.33)
$D_i^{7}T_i$	108.80	357.67	-232.72	846.99	1,481.63	-126.04
	(0.42)	(1.13)	(-0.45)	(1.24)	(1.69)	(-0.11)
Constant	2,152.98	2,141.09	2,159.77	6,191.33	6,183.64	6,325.81
	(136.48)	(136.37)	(135.73)	(119.37)	(118.57)	(118.53)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	174,963	169,231	165,864	82,265	79,505	77,028

Notes: This table shows the β_t-estimates and corresponding t-statistics of our main specification (Eq. 2) measuring the per period treatment effects for month t, where $t = 0$ is the month of the first survey. Underlying standard errors are clustered at the individual level. All estimations include time and individual fixed effects and use the monthly savings balance, winsorized at the 5% and 95%-percentiles of the respective month, in euros as the dependent variable ($Y_{i,t}$). T_i equals 1 if individual i is in the treatment group and zero otherwise. The coefficients are estimated considering all subjects in our data set (Columns 1-3) and active savers only (Columns 4-6). Columns 1 and 4 show the estimates for the full sample of the respective group, while Columns 2 and 5 (columns 3 and 6) present the estimation results for subjects with a financial literacy score below or equal to the median (above the median). The full samples of all subjects (Column 1) and only active savers (Column 4) include monthly panel data on individuals in the Control (N=327 in Column 1/N=186 in Column 4), Treatment (N=420/N=216), and Zero-touch groups (N=8,008/N=3,714). The median splits result in the following number of observations (N in Control/N in Treatment) in different columns: (2): 221/237; (3): 106/183; (5): 130/133; (6): 56/83. For 99.67% of the subjects, we have a balanced panel of 20 months. We exclude individuals with less than 18 monthly data points. We omit the month before the first survey ($t = -1$). The estimates and t-statistics correspond to Panels c and d of Figure A5.

Electronic copy available at: https://ssrn.com/abstract=4260867

Recent Issues

No. 361	Ata Can Bertay, José Gabo Carreño Bustos, Harry Huizinga, Burak Uras, Nathanael Vellekoop	Technological Change and the Finance Wage Premium
No. 360	Alfons J. Weichenrieder	A Note on the Role of Monetary Policy When Natural Gas Supply Is Inelastic
No. 359	Spencer Yongwook Kwon, Yueran Ma, Niklas Kaspar Zimmermann	100 Years of Rising Corporate Concentration
No. 358	Matteo Bagnara, Ruggero Jappelli	Liquidity Derivatives
No. 357	Huynh Sang Truong, Uwe Walz	Spillovers of PE Investments
No. 356	Markus Eyting	Why do we Discriminate? The Role of Motivated Reasoning
No. 355	Stephan Jank, Emanuel Moench, Michael Schneider	Safe Asset Shortage and Collateral Reuse
No. 354	Sebastian Steuer	Common Ownership and the (Non-)Transparency of Institutional Shareholdings: An EU-US Comparison
No. 353	Olga Balakina, Claes Bäckman, Andreas Hackethal, Tobin Hanspal Dominique M. Lammer	Good Peers, Good Apples? Peer Effects in Portfolio Quality
No. 352	Monica Billio, Michele Costola, Loriana Pelizzon, Max Riedel	Creditworthiness and buildings' energy efficiency in the Italian mortgage market
No. 351	Markus Dertwinkel-Kalt, Johannes Kasinger, Dmitrij Schneider	Skewness Preferences: Evidence from Online Poker
No. 350	Ruggero Jappelli, Konrad Lucke, Loriana Pelizzon	Price and Liquidity Discovery in European Sovereign Bonds and Futures
No. 349	Monica Billio, Michele Costola, Iva Hristova, Carmelo Latino, Loriana Pelizzon	Sustainable Finance: A journey toward ESG and climate risk
No. 348	Fabian Nemeczek, Jan Wedigo Radermacher	Personality-Augmented MPC: Linking Survey and Transaction Data to Explain MPC Heterogeneity by Big Five Personality Traits

Electronic copy available at: https://ssrn.com/abstract=4260867