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DISCUSSION PAPER

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Households' Financial Resilience, Risk Perceptions, and Financial Literacy – Evidence From a Survey Experiment

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Households' financial resilience, risk perceptions, and financial literacy – evidence from a survey experiment

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Abstract:

We examine the financial resilience of Austrian households, relating it to their experience of financial shocks earlier in life and to their financial literacy. We find that previous negative (positive) financial shocks are negatively (positively) related to financial resilience. Financial literacy and households' financial resilience are positively related. Based on a randomized survey experiment, we investigate the role of over-optimism when evaluating the potential impact of future events on households' financial situation. Households are asked to assess specific risks for their own household (treatment) or for a household with similar characteristics (control). On average, households assign a lower probability to shocks that negatively affect personal finances if asked for their own household compared to a similar household. We do not find the reverse effect for positive shocks. We find a negative correlation between over-optimism and financial literacy, indicating that financial literacy is relevant to both, financial behavior and the ability to assess financial shocks.

JEL classification: D14, D91, G53

Keywords: financial fragility, expectations, risk assessment, financial behavior, over-optimism

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1 Introduction, motivation and main results

The recent pandemic-induced economic crisis strikingly showed how important it is for households to adapt to changing economic circumstances and to weather financial shocks. Financial resilience is the ability to cope with negative shocks to one's income, helping to avoid financial hardship, excessive debt, and poverty. The ability to withstand economic shocks is crucial to the financial well-being of households. At the individual level, it is related to the availability of financial resources but also to the ability to anticipate and assess future situations and prepare for them accordingly. In this sense, one key element of economic models of behavior is the individual's perceptions of risk, their ability to form expectations about the future and to act accordingly.[3] From a macro-economic point of view, it is important to examine how global events such as an economic crisis affect households and how households are prepared to buffer the impact of specific shocks.

Recent contributions document a relationship between financial literacy and financial resilience (e.g., Lusardi et al. 2011, Wiersma et al. 2020, Cziriak 2022, Lusardi and Streeter 2023, Hasler et al. 2023). A proposed mechanism for this relationship is that households with higher financial literacy are more adept at anticipating and preparing for potential future shocks. This raises the question about the relationship between households' ability to assess potential future financial risks, their financial resilience, and their financial literacy.

We investigate this question in two steps: First, we assess the relationship between the financial resilience of households, their past experiences of financial shocks, and their financial literacy. Second, we explore how households assess potential future economic shocks, and what role financial literacy plays in this assessment.

In the first step, we measure Austrian households' financial resilience by examining their ability to face unexpected expenses. To this end, we designed a survey asking households if they can come up with a specific amount of money in case of a hypothetical financial shock – similar to the approach suggested by Lusardi et al. (2011). We relate financial resilience to household's past exposure to (positive or negative) financial shocks and their financial literacy. In a second step, we run a survey experiment about households' expectations of the likelihood that specific shocks such as unemployment or income losses occur to them in the future. We are particularly interested in how financial literacy is related to these risk perceptions.

Our main results are the following. First, there is substantial variation in Austrian households' ability to withstand a hypothetical economic shock. About three-quarters of the sample report that they are in a position to deal with an unexpected financial shock of around 1.000 EUR at short notice. Households previously affected by negative shocks demonstrate a lower capacity to withstand economic adversity, while those with positive past experiences show greater resilience. This may be related to the fact that households who experienced shocks in the past already depleted their financial buffers and are hence more vulnerable. It may also reflect the fact that some households are, in general, more vulnerable to financial shocks. Moreover, we find a positive correlation between financial resilience and financial literacy in accordance with similar studies for other countries (see, e.g. Wiersma et al. 2020 for results on the Netherlands, Clark et al. 2021, Lusardi and Streeter 2023, and Hasler et al. 2023 for the US,

[3] For a seminal contribution of household expectations, see Manski (2004).

and Cziriak 2022 for Germany). Financial literacy thus seems to be conducive to the preparedness for adverse events.

Second, we randomly split our sample into a treatment and a control group. Both groups assess the likelihood of being subject to specific future events that might affect the financial situation negatively or positively. In the treatment group, these questions are framed for the own household. In the control group, the questions are framed for an identical twin neighbor, i.e. a household with very similar characteristics compared to their own household. If individuals are over-optimistic about their future, they assign lower probabilities to negative events and higher probabilities to positive events if asked about themselves, as compared to a twin household with similar characteristics.[4] Such over-optimism might lead to inadequate preparation for future shocks, particularly detrimental if these shocks are negative.

We find that households in the treatment group assess the likelihood of being affected by a potential future negative shock as lower for their own household compared to the control group assessing a similar household, indicating a tendency towards over-optimism. There are no differences in the evaluation of positive financial shocks. Moreover, households with higher levels of financial literacy are more likely to assess the potential future risks in the same ways for their own compared to a twin household. Overall this indicates that households might have difficulties assessing future financial risks, especially if these risks can affect their finances negatively. This pattern is stronger among households with lower financial literacy. Thus, over-optimism could be one factor contributing to the lower financial resilience of households with low financial literacy.

The analyses are based on data from a representative sample of about 1,400 Austrian households. The survey was run before the onset of the COVID-19 crisis and stems from the 2019 wave of OeNB data collection on financial literacy, the Austrian Survey of Financial Literacy (ASFL) (Fessler et al. 2020). Next to an extensive set of questions on financial literacy and financial resilience and other measures of financial behavior, we introduced a survey experiment on risk perceptions into this data set. We split the sample randomly into two groups. We asked one group of households to rate their personal assessment of risks related to certain negative and positive economic shocks, such as, e.g., unemployment, an income loss, or an income increase. We asked the second group to assess the same set of shocks for a household that is very similar to the own household in terms of characteristics.

Our results help to improve our understanding of households' financial resilience. Lusardi et al. (2011) document the financial resilience of households from a series of developed countries after the financial crisis in 2007-08. Follow-up studies examine households in the US (Hasler et al. 2018, Clark et al. 2021, Hasler et al. 2023), the Netherlands (Wiersma et al. 2020) and Germany (Cziriak 2022). Demertzis et al. (2020) measure financial fragility of households from a European perspective. Some of these papers also document a positive relationship between financial resilience and financial literacy (e.g. Lusardi et al. 2011, Wiersma et al 2020, Clark et al. 2021, Cziriak 2022, Lusardi and Streeter 2023, Hasler et al. 2023). Cziriak (2022) finds that financial literacy has a protecting role in case of financial shocks. He finds that German households with higher financial literacy had a lower likelihood that a financial shock during the COVID-19 induced economic crisis increased households' financial fragility. Based

[4] See also Weinstein (1980).

on a similar set of questions, we document financial resilience of Austrian households, and how it is related to financial literacy and past financial experiences.

Second, we contribute to the growing literature measuring households' ability of assessing future risks. Most of these studies elicit expectations about macroeconomic variables such as inflation, interest rates, or the economic development in general (see e.g., Malmendier and Nagel 2011 and 2016, Das et al. 2020, Andre et al. 2022). Related to that, there are studies which examine price expectations for the stock market, houses and the labor market (see Breunig et al. 2021, Horn 2023, Kuchler and Zafar 2019). Only few studies consider expectations about major personal life events, such as unemployment, income risk, or mortality (see Hurd 2009, Heimer et al. 2019). Hudomiet et al. (2018) find strong heterogeneity in formulating subjective expectations and document correlations with probability numeracy. Malmendier and Shen (2018) document that personal experiences of high local and national unemployment, as well as own unemployment change individual's beliefs about future economic conditions and have consequences for consumption. Our research extends this literature by using a randomized survey experiment to investigate over-optimism in individual assessments of specific financial risks. Moreover, we specifically investigate the role of financial literacy for these risk perceptions.

Our results are important in the aftermath of the COVID-induced economic turmoil, the economic consequences of the war in Ukraine, and the energy crisis. High inflation and high economic uncertainty are putting many households in a difficult situation, and many might not be in a position to buffer additional shocks. Assessing financial and economic risks and building means to buffer shocks is important for financial resilience. In line with the previous literature we show that financial literacy is related to financial resilience of households. What is more, we can show that households are on average over-optimistic when evaluating potential future negative financial shocks. Over-optimism is stronger among those with lower financial literacy. This could have harmful effects if over-optimistic households fail to build sufficient buffer savings.

The rest of the paper is structured as follows. In the next section we introduce the data set and describe the variables. In section 3 we present empirical evidence on financial resilience. In section 4 we describe the survey experiment on risk perceptions. We conclude in section 5.

2 Data set

This study is based on the Austrian Survey of Financial Literacy (ASFL), the Austrian contribution to the OECD/INFE survey on adult financial literacy. The OECD/INFE initiative, a collaborative global effort, seeks to enhance understanding of financial literacy across different countries and cultures. It provides a comprehensive framework for assessing financial literacy, promoting consistent and rigorous international comparisons. The standard OECD survey comprises questions on financial knowledge, attitudes and behavior, used by the OECD to calculate the respective financial literacy scores, as well as several control variables and demographics (see OECD 2018 and Fessler et al. 2020 for further details). For Austria, the survey was extended to cover various aspects related to the expectations about economic risks, the personal past experience of such risks, and a series of financial resilience indicators. The wording of selected core questions used in this study are reported in the appendix.

For the ASFL survey, we conducted 1,418 computer-assisted personal interviews (CAPIs) in April and May 2019, that is about one year before the Corona crisis. Participants are representative for the Austrian population: detailed summary statistics of the sample are shown in Table 1. [5] [6]

2.1 Financial resilience

We measure financial resilience using a set of questions similar to those developed by Lusardi et al. (2011) which capture households' ability to deal with a mid-sized emergency of USD 2.000 within one month. In their paper the focus was on measuring the consequences of the 2007-08 financial crisis on households. The same measure has recently been employed, e.g., by Clark et al. (2021), Cziriak (2022), and Wiersma et al. (2020). Cziriak (2022) discusses the advantages of this direct measure of financial resilience as opposed to measures based on information from households' balance sheets. Compared to the measure by Lusardi et al. (2011) our measure is slightly more differentiated because we capture households' ability to deal with financial emergencies of different magnitudes between 100 EUR up to 5.000 EUR. The exact wording of the questions is as follows:

Would you be able to cover unexpected one-off expenses at short notice (a) a mobile phone bill of EUR 100, (b) a new washing machine for EUR 500, (c) a dentist bill of EUR 1,000, (d) repairing water damage for EUR 2,000, (e) a car repair for EUR 5,000?

Based on this question we define five indicator variables to reflect whether a household confirms that they are able to cover expenses of a given size. Figure 1 shows, that almost all households (96.2%) can deal with an unexpected expense of 100 EUR; 87.2% can come up with an unexpected expense of 500 EUR. 75.4% of the households in the sample can cover unexpected expenses of 1,000 EUR, and 64.7% can cover 2,000 EUR. Only 44% are able to cover expenses of 5,000 EUR. In a comparable setting and on a reverse scale Cziriak (2022) reports, that among German households during the COVID-19 pandemic 31% reported that they are unable to come up with 2,000 EUR within a month.

2.2 Experience of shocks

In a first step, we are interested in the relationship between the past experience of economic shocks, financial literacy and financial resilience. Therefore, we asked households about their previous experiences of economic shocks in the last ten years that affected their financial

[5] The survey is based on stratified multistage clustered random sampling, using NUTS 3 regions, municipality size as well as districts in Vienna for regional stratification. We allowed for replacement of unit nonresponse by drawing new addresses. The gross sample consisted of 3,356 households (3,201 after neutral dropouts). Respondents within households were drawn randomly. The nonresponse rate was about 55.7%. We used survey weights to produce descriptive population statistics throughout the article. The weights consist of a combination of (sample) design weights and post stratification weights based on external population statistics on age and gender at the province level.

[6] Measures for the socio-demographic background are either at the level of the individual or at the household level. Personal level controls are: Age (in age categories), gender, education (in categories), relationship status (in categories), employment status (in categories) and migration background. Household level variables are household size (in categories), municipality size (in categories) and income. In the regressions below all variables and all interactions refer to dummies for each category (leaving a reference category outside).

situation. Specifically, we asked whether their household finances were ever affected negatively or positively by any of the following events (exact wording of the question in the Appendix A.2): (1) unemployment of a household member, (2) low income of a household member, (3) longer periods of illness or need for care of a household or family member, (4) additional expenses for childcare, (5) major expenses (e.g. to repair the car, technical devices or damage of the house/apartment), (6) divorce or dissolution of partnership, (7) loss in value of an important asset (e.g. house/apartment or equity funds). The positive events are: (8) positive career development, (9) high income of a household member, (10) inheritance, (11) gain in value of an important asset (e.g. house/apartment or equity fund), and (12) monetary gains (e.g. lottery) or gifts. We placed these questions about economic shocks strategically at the end of the survey and designed them carefully to ensure that they did not bias responses to other questions or influence the outcomes of the survey experiment.

Figure 2 Panel A shows the frequency in which respondents have experienced these events. The most frequent unexpected event with financial consequences is the experience of major unexpected expenses reported by about 34.6% of the households. The second most important unexpected event is unemployment experienced by 16.6% of the households. Income loss (12.8%), long-term care expenses (15%) and unexpected childcare expenses (12.6%) are in a similar order of magnitude. The experience of positive financial events, such as a positive career development (9.7%), an inheritance (7.3%) or a gift (7.1%), are reported less frequently on average.

2.3 Financial literacy

In addition, we have information on financial literacy. We use the financial knowledge score developed by the OECD (see OECD 2018 and Fessler et al. 2020 for details). The measure is based on a set of seven financial knowledge questions. The questions cover the understanding of key economic and financial concepts such as interest rates, compound interest, inflation, real interest rates, risk diversification and the link between risk and return. The exact wording of the questions is reported in appendix A.1. The financial literacy score counts the number of correctly answered questions and it can take values between zero and seven.

Each of the financial knowledge questions offers the possibility of reporting “do not know”. We count the number of “do not know” responses to the financial literacy questions. This has been shown to be an important proxy of how confident individuals feel about their financial knowledge and influences financial behavior (Bucher-Koenen et al. 2021). This indicator also takes values from zero to seven. The distribution of “do not know” responses provides insights into the confidence levels of respondents regarding their financial knowledge, shedding light on the psychological aspects of financial decision-making.

On average, respondents answer 5.3 of the financial literacy questions correctly. Figure 3 Panel A shows that 28.6% of respondents can answer all of the seven knowledge questions correctly. The share of respondents with six of the questions answered correctly is equally high (28.6%). However, the share of respondents that perform poorly in this test is also non-negligible: 14.5% of the respondents answer three or less questions correctly. Figure 3 Panel B shows the fraction of respondents with 0 to 7 do not know responses. The fraction of respondents that select “do not know” for six or seven questions is low (1.1%). However, more than one third (33.6%) of the respondents select a “do not know” response in at least one out of seven questions.

The response behavior by socio-demographic variables shows the typical pattern (see Table A.1 and Fessler et al., 2020, for more details): financial literacy is lower among the youngest age group (15-29 years old) compared to all older age groups. Furthermore, financial literacy is lower among women, those with lower education and income, those living alone and those born outside Austria. These patterns are comparable to results from other studies on financial literacy (see Lusardi and Mitchell 2014 for a review). For the number of "do not know" answers we show the reverse pattern (see column 3 in Table A.1).

3 Financial resilience, financial literacy, and past shocks

In the first step of our analysis we are interested in the relationship between financial resilience, financial literacy, and the previous experience of financial shocks.

Bivariate analyses with socio-demographic variables are shown in Table 2 for the probabilities to come up with amounts between 100 EUR and 5,000 EUR. Overall, the following patterns are revealed: The ability to cover unexpected expenses is higher among older respondents, among men, those with higher education and income, married couples and those working fulltime or in retirement. The patterns are similar for coming up with smaller compared to larger amounts, but they are on different levels.

We examine financial resilience in a multivariate framework in order to examine the role of financial shocks in the past, and financial literacy controlling for socio-demographic characteristics.

Since our measure of financial resilience consists of five categories, we run five separate regressions of the following form:

$$Y_i = \alpha + \beta_1 past\ shocks + \beta_2 fin\_lit + \gamma X_i + \varepsilon_i \quad (1)$$

where Y_i are the five indicators for coming up with 100, 500, 1000, 2000 and 5000 EUR, respectively. $past\ shocks$ are two indicators of the experience of any negative or positive events, respectively. This means if any of the positive or negative events has been experienced the indicator is one and zero else. fin_lit is the score of financial literacy. Additionally we include an indicator of the sum of the "do not know" responses to the financial literacy questions. X_i captures the socio-demographic control variables, namely gender, age, income, employment status and marital status.

Results are shown in Table 3. We find a persistent and strong positive relationship between financial literacy and households' financial resilience. This is in line with previous papers on financial fragility which document the relationship to financial literacy (e.g. Clark et al 2021, Wiersma et al. 2020 and Cziriak 2022). The relationship with financial literacy is stronger for the questions that ask for a larger monetary sum to cover, i.e. the normalized indicator of financial literacy increases from 0.016 for the question on 100 EUR to 0.064 for the 2,000 Euro question (but declines slightly for the 5,000 EUR question). We do not find a significant or sizable relationship between the number of "do not know"-responses in the financial literacy questions and household financial resilience.

Moreover, we find a negative relationship between negative financial shocks experienced in the past and financial resilience and a positive relationship with positive past financial shocks. The relationship is particularly strong and significant for the larger sums to cover. We also investigated the role of specific financial shocks (results are reported in Appendix Table A.2). Among the negative shocks, unemployment shows the most important and consistent pattern over all five financial resilience measures. Income risk is also negatively related to financial resilience, the effect is smaller compared to the effect of unemployment and only significant at the 10% level in two out of five regressions. Long-term care seems to be relevant only for the instances of larger expenditure, however in these categories, the effect is relevant and of similar size compared to the unemployment effect. Divorce risk is marginally relevant, and the loss in asset value is even slightly positively related to financial resilience. This might indicate, that the respective losses in value might also be coupled with financial gains.

Regarding the positive risks, the results show that positive career developments matter for the ability to come up with small sums, income increases are relevant for coming up with larger sums of 1.000 EUR or more. All other effects are small and only significant at the 10% level in some instances.

Overall, we find that – in line with the literature – financial literacy and financial resilience are related. Moreover, we find that past negative economic events are negatively correlated with households' resilience, and that negative events seem to matter more than positive events.

4 Survey experiment on risk perceptions

4.1 Experimental design

Since we are interested how individuals perceive potential economic risks, we measure the *expectations of economic shocks* using direct self-assessed questions about factors which can positively or negatively affect the financial situation of a household. All risks are rated on a scale ranging from one – (almost) impossible – to ten – (almost) certainly, depending on how likely households estimate that a certain event will materialize and affect the financial situation of the household. The events are for example unemployment, income decreases and increases, divorce, and health problems.

The questions were asked during the interview in two different formats (*between subjects design*). Half of the sample were asked about the expectations of those risks for their own household (**treatment group**), the second half of the sample was asked about the expectations of the same risks with respect to a household, which is very similar to the own household (**control group**). The questions were split into events which could negatively or positively influence the financial situation of the household. The wording of the question is:

There may be situations in life that can positively/negatively affect your financial situation. I will now read some examples to you.

Treatment*: In your opinion, how likely is it that* ***your household*** *experiences the following situations over the next ten years? Please rate the likelihood of such a situation occurring on a scale from one – (almost) impossible to occur – to ten – will (almost) certainly occur.*

Control*: In your opinion, how likely is it that* ***a household, which is similar to yours****, experiences the following situations over the next ten years? Please rate the likelihood of such a situation occurring on a scale from one – (almost) impossible to occur – to ten – will (almost) certainly occur.*

The specific negative events are: (1) unemployment of a household member, (2) low income of a household member, (3) longer periods of illness or need for care of a household or family member, (4) additional expenses for childcare, (5) major expenses (e.g. to repair the car, technical devices or damage of the house/apartment), (6) divorce or dissolution of partnership, (7) loss in value of an important asset (e.g. house/apartment or equity funds).

The positive events are: (1) positive career development, (2) high income of a household member, (3) inheritance, (4) gain in value of an important asset (e.g. house/apartment or equity fund), and (5) monetary gains (e.g. lottery) or gifts (see the appendix A.3 for the exact questions).

A between subjects design was chosen to reduce experimenter demand effects and survey fatigue induced by asking a very similar and long set of questions twice over the phone. The placement of the questions was almost at the end of the interview and after individuals had reported financial behaviors and answered questions regarding financial literacy. We define variables reflecting the ratings for the seven negative and five positive events. We define $R_k \; with \; k = 1, \dots 12$ which reflects the subjective probability of an event k occurring and affecting the financial situation of the household on a scale from 1 (low probability) to 10 (high probability).

Survey participants were randomly assigned to either the treatment or the control group. Out of 1,418 observations 712 are in the treatment group and 706 in the control group. We report summary statistics by group in Table 1. Randomization tests in Column 4 of Table 1 suggest small differences in the socio-demographics between treatment and control group. We report further checks below and we will insert socio-demographic characteristics as control variables in some of our analyses of the treatment effects.

4.2 Empirical Strategy

Our empirical strategy follows Imbens and Rubin (2015) for estimating treatment effects in randomized experiments.

As a first step we investigate whether the risk perceptions differ between the treatment group and control group. For each of the twelve different measures we regress the risk assessment (*R*) on the treatment dummy and a constant. Treatment status is 1 if the question was framed in a way that the probability is related to the household of the respondent (treatment group) and 0 if it is related to a similar twin household (control group). α is a constant, β is the average treatment effect and ε a mean zero error term.

$$R_i = \alpha + \beta \cdot T_i + \varepsilon_i \tag{2}$$

Under the assumption that treatment status is random, this regression gives us the unbiased average treatment effect. However, even if the treatment status is randomly assigned, sampling error can generate correlations between treatment status and certain characteristics which might at the same time be related to the treatment effects. Moreover, since we would like to estimate the average treatment effects and at the same time allow for effect heterogeneity, we follow Imbens and Rubin (2015) and add (demeaned) controls as well as demeaned interactions with socio-demographic characteristics and financial literacy. We include the covariates in deviations from the sample average, so that the estimated coefficient on the treatment indicator β can be interpreted as an estimate of the average treatment effect in the population.

$$R_i = \alpha + \beta \cdot T_i + (X_i - \bar{X}) \cdot \varphi + T_i(X_i - \bar{X})\theta + \varepsilon_i \quad (3)$$

Note that because of demeaning, the coefficient β for the treatment status is still the average treatment effect. The coefficients θ for the interactions show the deviations from the average treatment effect related to socioeconomic groups. Hence, they allow us to evaluate whether the treatment effects differ by socio-demographic groups. We are specifically interested in the interaction between the treatment effect and financial literacy. The φs show for each of the characteristics if the allocation to treatment and control group differs for this characteristic. Ideally, all of these coefficients would be 0.

We run all regressions (eq. 2 and eq. 3) for all twelve events (7 negative and 5 positive events) separately. If individuals are over-optimistic we would expect the coefficient of the average treatment effect to be negative for the seven events associated with negative effects on household finances. In contrast, we would expect positive treatment coefficients for the five events associated with positive effects on household finances. Moreover, we expect the treatment effect to be stronger for those with lower financial literacy as compared to those with higher financial literacy. This means that we expect the interaction effect between the treatment indicator and the financial literacy score to be negative for the negative future events and positive for the positive events.

The crucial identifying assumption is that the random assignment worked. For this purpose, we regress the treatment assignment on observable characteristics. In Table 1 we reported results from bivariate balance checks. Additionally, we run regressions with treatment assignment as dependent and observable characteristics as independent variables. If assignment is random no observable characteristic should be informative to predict treatment assignment. We report the results of a logit regression in Table A.3 in the appendix. It shows that random treatment assignment was successful. There is only one marginally significant effect (being married). As we have 23 variables in the model, such a result would be expected randomly and we conclude that random assignment was successful. Note that when we estimate eq. 3 we are controlling for differences in observable characteristics and potential nonrandom assignment on observables is taken care of.

Another possible threat to identification is selection after treatment assignment. At this stage we operate under a missing at random (MAR) assumption, meaning that we ignore individuals with missing answers. Note that we do not have any missing values in the control variable set *X*, but we have missing values in our set of dependent variables *R*. The reason for this is that we allowed individuals to respond with “Do not know”, “no answer”, “doesn’t apply” in the questions about specific financial risks. Under the MAR assumption we can simply exclude them from regressions. However, this could bias our results if respondents asked about their own household have a different likelihood of answering with “do not know”, “no answer” or “does not apply” compared to households who report the expectation for a twin household. Table A.4 in the appendix shows the share of respondents who report “do not know”, “no answer” or “does not apply”. There are no systematic differences between the treatment and control group in the fraction of respondents who reply with “do not know” and “no answer”. However, there are some differences in the fraction of households who answer with “does not apply”. We address this issue by reporting subsample analysis in the robustness checks (see appendix Table A.5). For example we exclude pensioners from the question about the risk of becoming unemployed or being faced with unexpected child care expenses.

4.3 Risk perceptions

In this section we analyze which risk perceptions individuals hold in general and how it relates to past risk experience and socio-demographic characteristics. Figure 2 Panel B shows the mean of risk assessment of respondents on a scale from 0 to 10 when asked about the likelihood of seven different negative events and five different positive events. The dominating risk factor is unexpected major household expenses with an average score of 5.1. This is followed by the costs related to longer periods of illness or need for care of a household or family member with a score of 4.4. However, when contrasting the perceived likelihood of associated positive and negative events (e.g., asset price gain vs. asset price loss), there is a trend towards optimism, with respondents generally assigning higher probabilities to positive than to negative outcomes. The likelihood of gain in the value of an important asset is considered higher than that of potential asset value losses. Similarly, the likelihood of an unexpectedly positive career development is assessed higher than that of unemployment of a household member, while the risks of unexpectedly low or high income of a household member is assessed about balanced. The distributions of all responses are reported in appendix Table A.4.

In order to check the validity of our measures of risk assessment we compare the subjective risk perceptions with the past experiences reported before. The reasoning is that somebody with past negative experience should be more aware of potential future negative risks. When comparing panels A and B of Figure 2 we can already get an impression of the general patterns. Risks which have been experienced on average more frequently in the past are assigned higher values for the future. Table 4 reports the correlations between past shocks and future risk perceptions for all shocks. People with past personal unemployment episodes indeed give a higher probability to unemployment risks. Those who experienced unexpected income losses in the past also attribute a higher probability to a future income loss. Past episodes of longer illness or need for care within the family make people more aware of the risk that this may repeat in the future. The same applies to past experience with unexpected expenses for childcare. Finally, major unexpected household expenses, e.g. for repair, increase people's perception about the likelihood of future repair costs. We do not find significantly positive correlations between past divorce experiences and future risks, nor is there a clear link between experience with asset price losses and the fear of future losses.

When it comes to positive shocks, we also find positive correlations between past experiences and future risk assessments for career developments, income increases, inheritance, increases in assets' value, or monetary gains or gifts.

We also analyze subjective risk perceptions by observable characteristics, such as employment status, age, and household composition. Our results show, for example, that older individuals worry less about unemployment, while those currently unemployed worry more. Younger individuals below the age of 30 worry more about potential future income losses compared to those above 60, and larger households worry more compared to smaller households. The assessed likelihood of longer periods of illness or need for care of a household or family member increases with the age of the respondent and for retired as compared to full-time working individuals. Furthermore, the risk of unexpected additional expenses for childcare is the highest among the 30-44 year old respondents; it is higher for married and divorced as compared to single households. It also increases with the household size, and with the educational background of the respondent. Overall, these validity checks seem to support the fact, that the measure of risk perception contains sensible information.

4.4 Treatment effects and effect heterogeneity

After this general assessment of risk perceptions we move on to our experiment to see whether people perceive risks differently, depending on whether they are asked about themselves or their identical twin neighbor. In Figure 4 we plot the average response to the risk measure by treatment group, i.e. the treatment group answers the risk measure for themselves and the control group for a twin household. In Panel A the treatment effect for the negative events is shown. For five out of seven negative events, namely unemployment, income risk, childcare expenses, divorce and loss in asset value, households who are asked to rate their own risk indicate a lower likelihood to face this negative event compared to households that are rating the same event for a household similar to their own. We do not detect this pattern for long term care risk and major expenses. In these cases the risks are evaluated almost equally. Regarding the positive events we find similar patterns for all five incidents: The households who rate these risks for themselves rate the chances to experience the respective event on average lower as households who rate the likelihood for a similar household. Interestingly, while the pattern detected for the negative events is in line with the over-optimism hypothesis, the pattern for the positive events does not line up with our expectation.

We estimate five alternative specifications, adding controls and interactions consecutively for all 12 events. Table 5 reports results of all those regressions. Due to the length of the tables and because we are estimating this for all 12 risk assessments separately, we only report treatment effects as well as the effects of financial literacy. All other coefficients are suppressed for better readability.[7]

We find highly significant treatment effects in the case of the negative events of unemployment, income and divorce, significant at the 1% and 5% significance levels, respectively. This means that individuals asked about their own as compared to a twin neighbor rate the risk of being affected by such a shock in the future as lower. Evaluated at the means the effects are rather large and reduce the subjective assessment of the negative event by between 10.0% and 15.6% for unemployment, 10.5% and 11.2% for income and 14.3% and 14.6% for divorce. We find no significant treatment effects for the other negative events. [8]

We find no significant treatment effects with regard to positive events, except for income increases where the effect is marginally significant at the 10% level for two out of five specifications. However, contrary to the hypothesis, the treatment reduces the rating of the occurrence of such an event in this instance. Thus, there is no evidence of over-optimism for positive future financial shocks.

In column (4) of table 5 we added the financial literacy score and the interaction with the treatment effect. The results show that overall, individuals with higher financial literacy rate the risks of negative events as lower compared to individuals with lower financial literacy controlling for differences in socio-demographic characteristics. This means that individuals

[7] Full regressions results are provided upon request.

[8] In appendix table A.5 we report robustness checks for subsamples. The effect for unemployment remains stable, when we exclude pensioners from the analyses. The effect on income risk becomes slightly smaller and insignificant in the robustness check. The same is the case for divorce risk, however here the effect remains marginally significant in the specification including financial literacy.

with higher financial literacy in general rate themselves and similar households as being less affected by potential future shocks as compared to households with lower financial literacy. This corresponds to our findings in the previous section that households with higher financial literacy are more financially resilient, i.e. they are better prepared to weather potential future shocks. The effects are significant for unemployment, income risk, and major expenses and marginally significant for long-term care and divorce risk. With regard to the interaction of the treatment effect and the financial literacy score we find risk perceptions of individuals with higher financial literacy are less likely to be affected by the treatment effect. In other words, individuals with higher financial literacy are more likely to give equal ratings to the negative risks for their own and a similar household. This effect is highly significant for income risk and marginally significant for major expenses – two of the most important risks when considering the result of past events. Other than that treatment effects seem to be rather similar across levels of financial knowledge. [9]

With regard to the positive events we find that those with higher financial literacy on average assign themselves and related households lower chances of experiencing a positive career development, an income increase, or receiving inheritances or gifts. There is no relationship between financial literacy and an unexpected increase in asset values. Thus, regarding future positive events financially literate households seem to be more pessimistic compared to households with low financial literacy. The interaction terms between financial literacy and the treatment are marginally significant in two instances. Households with higher financial literacy in the treatment group tend to rate income increases and positive career developments as marginally more likely compared to those in the control group.

Note, that all the other previous general results hold. This means, that the treatment effects are very robust even when controlling flexibly for financial knowledge, confidence and socio-demographics.

5 Conclusions

In this paper we examine Austrian households' financial resilience as measured by their ability to face major unexpected expenses. We find that while almost all households can afford relatively small unexpected expenses of 100 and 500 EUR, the fraction of households able to afford expenses of 1,000, 2,000 or even 5,000 EUR becomes substantially smaller. Whether households can afford major unexpected expenses is significantly related to the experience of past economic shocks. Households who have experienced unemployment or income losses in the past are less likely to be in a position to afford major expenses. At the same time financial literacy and financial resilience are positively related.

We ran a survey experiment asking households for a rating of future economic events that impose positive and negative financial risks, such as unemployment, health problems, income losses or income increases. Perceptions about the occurrence of future shocks and the experience of shocks in the past are highly correlated, giving us confidence that the evaluation of future risks contains meaningful information. We find that households rate negative shocks

[9] We also ran regressions where we added the number of "do not know"-answers and the interaction with the treatment effect as additional variables. We do not find any differences by confidence in financial knowledge as measured by the number of the "do not know" responses.

as less likely to occur for themselves compared to their twin household. This hints at the presences of over-optimism. On average those with higher financial literacy rate events with negative financial consequences as less likely to occur compared to those with lower levels of financial literacy. Households with higher financial literacy are more likely to rate the risks the same for themselves and a similar household, i.e. they show less over-optimism compared to households with low financial literacy.

Our results are particularly interesting since in Austria economic stability has been historically strong but currently faces unprecedented challenges and over-optimism of households towards future economic risks could have detrimental consequences. Over-optimistic households may not adequately prepare for potential economic downturns, leaving them vulnerable in times of crisis. This is especially critical given Austria's unique economic landscape, where small and medium enterprises play a significant role and many households are directly or indirectly connected to these businesses.

Therefore, programs aimed at enhancing financial literacy in Austria and similar countries should incorporate elements like buffer stock savings and the role of macro-economic risks in personal finances. Such programs could be particularly impactful if tailored to the specific economic and cultural context of Austria, potentially involving collaborations with Austrian financial institutions, educational bodies, and government agencies to reach a broad audience. Enhanced financial support programs, particularly for those previously impacted by economic shocks, could help households manage financial shocks. Moreover, the strong link between financial literacy and resilience points to the necessity of expanding financial education, focusing on risk awareness and management as well as financial planning. Such initiatives could significantly improve households' preparedness for economic uncertainties. Collaborative efforts between all stakeholders of financial education – such as the one initiated by the national financial literacy strategy for Austria (OECD, 2021) – could facilitate the implementation of such programs.

For future research, it would be insightful to explore the long-term impacts of such policy interventions on households' financial stability and their risk assessment behaviors.

References

Andre, P., Pizzinelli, C., Roth, C., and Wohlfart, J. 2022. Subjective Models of the Macroeconomy: Evidence From Experts and Representative Samples. *The Review of Economic Studies*, 89 (6), pp. 2958-2991, https://doi.org/10.1093/restud/rdac008

Breunig, C., Grabova, I., Haan, P., Weinhardt, F., and Weizsäcker, G. 2021. Long-run expectations of households, *Journal of Behavioral and Experimental Finance*, 31, 100535.

Bucher-Koenen, T., Alessie, R., Lusardi, A., and van Rooij, M. 2021. Fearless Woman: Women's Financial Literacy and Stock Market Participation, *ZEW Discussion Paper* No. 21-015.

Clark, R. L., Lusardi, A., and Mitchell, O. S. 2021. Financial fragility during the COVID-19 pandemic. *AEA Papers and Proceedings*, 111, pp. 292-296.

Cziriak, M. 2022. Financial fragility during the COVID 19 pandemic in Germany. *ZEW Discussion Paper* No. 22-070.

Das, S. Kuhnen, C., and Nagel S. 2020. Socioeconomic Status and Macroeconomic Expectations. *The Review of Financial Studies*, 33 (1), pp. 395432.

Demertzis, M., Domínguez-Jiménez, M., and Lusardi, A. 2020. The financial fragility of European households in the time of COVID-19 (Policy Contribution No. 2020/15). Bruegel.

Fessler, P., M. Jelovsek, and M. Silgoner. 2020. Financial literacy in Austria – focus on millennials. Monetary Policy & the Economy, Q3/20, pp. 21-38.

Hasler, A., Lusardi, A., and Oggero, N. 2018. Financial Fragility in the US: Evidence and Implications. *Global Financial Literacy Excellence Center Working Paper*, The George Washington University School of Business.

Hasler, A., Lusardi, A., Yagnik, N., and Yakoboski, P. 2023. Resilience and wellbeing in the midst of the COVID-19 pandemic: The role of financial literacy. *Journal of Accounting and Public Policy*, 42 (2023), 107079.

Heimer, R.Z., Myrseth, K.O.R., and Schoenle, R.S. 2019. YOLO: Mortality Beliefs and Household Finance Puzzles. *The Journal of Finance*, 74, pp. 2957-2996. https://doi.org/10.1111/jofi.12828

Horn, F., 2023. Distorted Unemployment Beliefs and Stock Market Participation. Working Paper. Available at SSRN: https://ssrn.com/abstract=4512101

Hurd, M. 2009. Subjective Probabilities in Household Surveys. *Annual Review of Economics*, 1, pp. 543-62

Hudomiet P., Hurd, M., and Rohwedder, S. 2018. Measuring Probability Numeracy, *RAND Working Paper* No. 1270.

Imbens, G. W. and D. B. Rubin. 2015. Causal Inference for Statistics, Social and Biomedical Sciences, An Introduction.

Kuchler, T. and Zafar, B. 2019. Personal Experiences and Expectations about Aggregate Outcomes. *The Journal of Finance*, 74, pp. 2491-2542. https://doi.org/10.1111/jofi.12819

Lusardi, A. and Mitchell O. S. 2014. The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature* 52 (1), pp. 5-44.

Lusardi, A., Schneider, D., and Tufano, P. 2011. Financially Fragile Households: Evidence and Implications. *Brookings Papers on Economic Activity*, Spring (1), pp. 83-134.

Lusardi A. and Streeter, J. 2023. Financial literacy and financial well-being: Evidence from the US. *Journal of Financial Literacy and Wellbeing* (2023), pp. 1-30

Malmendier, U., and Nagel, S. 2011. Depression Babies: Do Macroeconomic Experiences Affect Risk Taking? *The Quarterly Journal of Economics*, 126, pp. 373-416.

Malmendier, U., and Nagel, S. 2016. Learning from Inflation Experiences, *The Quarterly Journal of Economics*, 131 (1), pp. 53-87.

Malmendier, U., and Shen, L.S. 2018. Scarred Consumption. *NBER Working Paper* No. 24696

Manski, C.F. 2004. Measuring Expectations. *Econometrica*, 72 (5), pp. 1329-1376.

OECD. 2018. OECD/INFE toolkit for measuring financial literacy and financial inclusion. May 2018.

OECD. 2021. A national financial literacy strategy for Austria. https://www.oecd.org/daf/fin/financial-education/austria-financial-literacy-strategy.htm

Wiersma, J., Alessie, R. J. M., Kalwij, A., Lusardi, A., and Van Rooij, M. 2020. Skating on Thin Ice: New Evidence on Financial Fragility, *DNB Working Paper* No. 670. De Nederlandsche Bank.

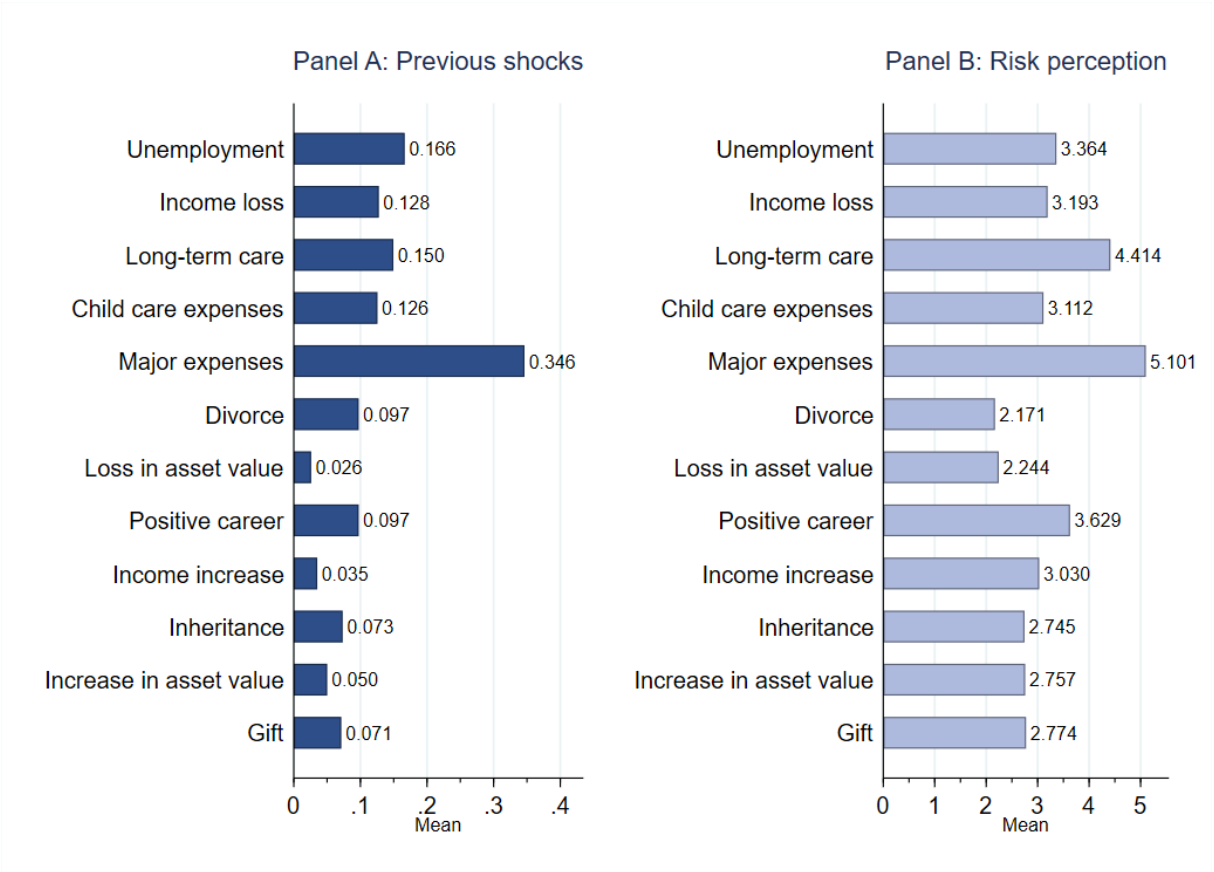
Weinstein, N. D. 1980. Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, 39 (5), pp. 806-820. https://doi.org/10.1037/0022-3514.39.5.806

Figures

Figure 1: Financial resilience of Austrian households

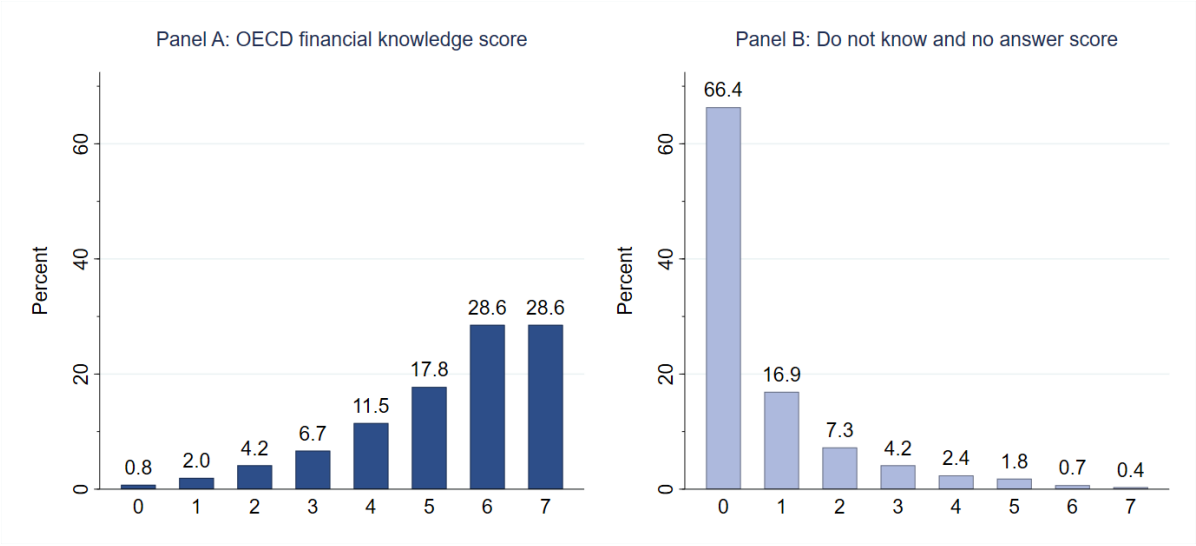
Notes: This figure shows the share of households who can afford unexpected expenses in the size of 100 Euro to 5000 Euro.

Figure 2: Experience of financial shocks and risk perception



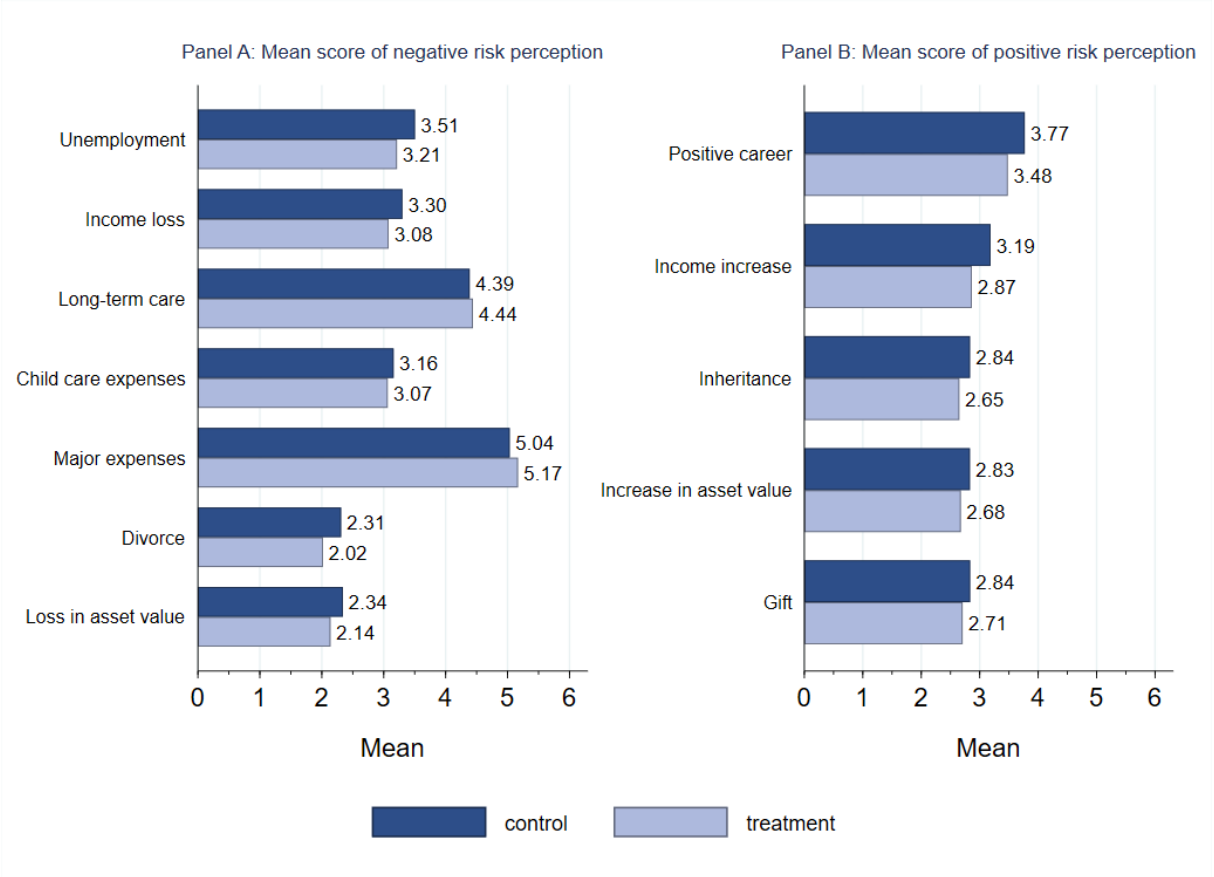
Notes: Panel A shows the mean for the binary variables of experience of financial shocks, which takes on the values one and zero; one means that the subject has experienced the financial shocks before and zero otherwise. Panel B shows the mean of the subject's risk perception on unexpected events, scaling from one ((almost) impossible to occur) to ten (will (almost) certainly occur).

Figure 3: Financial literacy of households



Notes: Panel A shows the percentage of respondents who answered 0 to 7 financial knowledge questions correctly. Panel B shows percentage of the number of don't know and no answer within to the financial literacy knowledge questions.

Figure 4: Risk perception between treatment group and control group



Notes: Panel A shows the mean score of the subject's risk perception on unexpected negative events. Panel B shows the mean score of the subject's risk perception on unexpected positive events. The dark (light) blue color reports the results of the control (treatment) group. All scaled from one ((almost) impossible to occur) to ten (will (almost) certainly occur).

Tables

Table 1: Summary statistics

	All	Treated	Control	Difference
Age 15-29	0.183	0.181	0.186	-0.006
	(0.013)	(0.018)	(0.018)	(0.026)
Age 30-44	0.238	0.236	0.240	-0.004
	(0.012)	(0.018)	(0.018)	(0.025)
Age 45-59	0.281	0.276	0.285	-0.010
	(0.013)	(0.018)	(0.018)	(0.025)
Age 60+	0.298	0.307	0.288	0.020
	(0.012)	(0.018)	(0.017)	(0.025)
Female	0.518	0.521	0.515	0.007
	(0.014)	(0.021)	(0.020)	(0.029)
Primary education	0.139	0.131	0.146	-0.015
	(0.010)	(0.014)	(0.015)	(0.021)
Lower secondary education	0.394	0.396	0.392	0.004
	(0.014)	(0.020)	(0.020)	(0.028)
Upper secondary education	0.368	0.375	0.361	0.015
	(0.014)	(0.020)	(0.020)	(0.028)
Tertiary education	0.099	0.098	0.101	-0.004
	(0.008)	(0.012)	(0.012)	(0.017)
Single	0.246	0.260	0.233	0.028
	(0.013)	(0.019)	(0.019)	(0.027)
Married/partner	0.55	0.52	0.58	-0.056*
	(0.014)	(0.020)	(0.020)	(0.029)
Divorced/living alone	0.138	0.146	0.130	0.015
	(0.009)	(0.013)	(0.013)	(0.019)
Widowed/no partner	0.067	0.073	0.061	0.013
	(0.007)	(0.010)	(0.009)	(0.013)
Fulltime	0.49	0.48	0.51	-0.030
	(0.014)	(0.021)	(0.020)	(0.029)
Parttime	0.097	0.104	0.089	0.015
	(0.009)	(0.013)	(0.012)	(0.017)
Unemployed	0.041	0.041	0.042	-0.001
	(0.006)	(0.008)	(0.009)	(0.012)
Retired	0.284	0.306	0.262	0.043*
	(0.012)	(0.018)	(0.016)	(0.024)
Other	0.088	0.074	0.102	-0.028
	(0.009)	(0.012)	(0.014)	(0.019)
Born outside Austria	0.085	0.077	0.094	-0.017
	(0.008)	(0.010)	(0.012)	(0.016)
1 person hh	0.316	0.329	0.304	0.025
	(0.013)	(0.019)	(0.018)	(0.026)
2 person hh	0.385	0.384	0.385	-0.001
	(0.014)	(0.020)	(0.020)	(0.028)
3 person hh	0.142	0.138	0.147	-0.010
	(0.011)	(0.015)	(0.015)	(0.021)
4 person hh	0.119	0.122	0.116	0.006

	(0.010)	(0.015)	(0.014)	(0.020)
5+ person hh	0.037	0.027	0.048	-0.021*
	(0.006)	(0.007)	(0.009)	(0.011)
Income missing	0.176	0.154	0.198	-0.043*
	(0.011)	(0.015)	(0.017)	(0.022)
Income: 0-900 EUR	0.035	0.037	0.034	0.002
	(0.005)	(0.007)	(0.007)	(0.010)
Income: 900-1350 EUR	0.085	0.084	0.086	-0.002
	(0.008)	(0.011)	(0.011)	(0.016)
Income: 1350-1650 EUR	0.067	0.076	0.058	0.018
	(0.007)	(0.011)	(0.009)	(0.014)
Income: 1650-1950 EUR	0.081	0.093	0.069	0.023
	(0.008)	(0.012)	(0.010)	(0.015)
Income: 1950-3000 EUR	0.243	0.260	0.227	0.033
	(0.012)	(0.018)	(0.017)	(0.024)
Income: 3000 EUR +	0.312	0.296	0.328	-0.032
	(0.014)	(0.019)	(0.019)	(0.027)
0-3000	0.243	0.254	0.233	0.021
	(0.012)	(0.018)	(0.017)	(0.025)
3000-5000	0.142	0.149	0.136	0.013
	(0.010)	(0.015)	(0.014)	(0.020)
5000-1 Mio	0.400	0.400	0.401	-0.001
	(0.014)	(0.020)	(0.020)	(0.028)
1 Mio+	0.214	0.197	0.230	-0.033
	(0.012)	(0.016)	(0.017)	(0.023)
Number of Observations	1,418	712	706	1,418

Notes: Column 2 reports the mean of listed socio-demographic variables for all participants. Column 3 and 4 report the mean of the treated group and the control group, respectively. Column 5 reports coefficients from bi-variate regressions of each variable in the left-most column on the treatment dummy. Robust standard errors are in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 2: Financial resilience, financial literacy and socio-demographic characteristics

	Share (%)	Can afford 100 EUR (%)	Can afford 500 EUR (%)	Can afford 1000 EUR (%)	Can afford 2000 EUR (%)	Can afford 5000 EUR (%)
15-29	18.35	91.71	71.09	50.62	40.09	21.85
30-44	23.83	96.13	82.21	69.19	58.84	36.03
45-59	28.06	96.90	88.70	78.81	69.16	50.00
60+	29.76	96.53	93.51	82.15	71.36	51.93
Male	48.20	95.47	85.81	75.42	66.22	47.10
Female	51.80	95.82	84.93	69.48	58.11	37.41
Primary	13.87	87.71	68.04	49.55	37.87	22.52
Lower secondary	39.39	96.95	88.06	72.60	61.50	38.96
Upper secondary	36.80	96.40	87.61	77.19	67.29	48.85
Tertiary	9.94	98.81	90.46	85.17	78.27	56.65
Single	24.64	91.56	73.29	56.17	46.17	26.40
Married/partner	54.85	97.60	91.77	81.04	72.89	54.09
Divorced/living alone	13.80	96.38	79.09	65.45	48.48	24.75
Widowed/no partner	6.70	93.30	90.17	74.76	59.28	37.10
Fulltime	49.03	98.67	91.62	79.40	67.49	45.41
Parttime	9.67	94.62	78.31	58.39	50.43	27.87
Unemployed	4.13	76.48	35.91	12.05	8.81	1.96
Retired	28.38	96.33	92.70	82.53	72.00	52.71
Other	8.79	86.81	57.65	43.76	37.03	23.62
Austria	91.48	96.05	86.99	74.24	64.12	43.99
Born outside Austria	8.52	91.41	67.84	52.00	39.46	21.60
Income missing	17.61	92.59	83.91	69.17	61.50	47.27
0-900 EUR	3.53	85.49	39.89	26.06	22.68	7.27
900-1350 EUR	8.50	92.34	71.67	48.52	34.36	14.96
1350-1650 EUR	6.72	93.04	84.56	67.84	48.79	26.15
1650-1950 EUR	8.10	97.55	77.63	68.25	59.35	28.37
1950-3000 EUR	24.34	97.83	89.31	74.57	60.64	38.33
3000 EUR +	31.20	97.81	94.13	86.15	78.93	60.39
Fin literacy score 0-3	14.71	87.95	67.84	47.64	37.40	22.63
Fin literacy score 4-7	85.29	96.98	88.38	76.60	66.27	45.43
Fin literacy don't know score 0	69.02	97.45	90.35	80.33	70.98	48.97
Fin literacy don't know score 1-7	30.98	91.64	74.24	54.54	42.06	26.72
Overall	100.0	95.65	85.35	72.34	62.02	42.08

Notes: Column 2 reports the share of each subgroup of the socio-demographic variables. Column 3 to 7 reports the percentage of each subgroup of socio-demographic variables for the ability to cover unexpected expenses from 100 Euro to 5,000 Euro.

Table 3: Regression results: Financial resilience, financial literacy and past financial shocks

	(1)	(2)	(3)	(4)	(5)
	Can afford unexpected 100	Can afford unexpected 500	Can afford unexpected 1000	Can afford unexpected 2000	Can afford unexpected 5000
Negative shocks	0.003	-0.014	-0.037***	-0.053***	-0.051***
	(0.005)	(0.010)	(0.010)	(0.011)	(0.011)
Positive shocks	0.021**	0.024	0.058***	0.062***	0.082***
	(0.008)	(0.017)	(0.019)	(0.022)	(0.022)
Financial literacy	0.016**	0.032***	0.055***	0.064***	0.053***
	(0.006)	(0.011)	(0.013)	(0.011)	(0.011)
Financial literacy don't know	0.003	0.003	-0.002	0.002	0.012
	(0.009)	(0.014)	(0.017)	(0.016)	(0.014)
Household and personal controls	YES	YES	YES	YES	YES
Obs	1418	1418	1418	1418	1418

Notes: This table shows results from linear regressions of financial resilience on previous financial shocks, which are summed into one score for negative shocks (takes value from 0 to 7, as there are 7 negative events) and positive shocks (takes value from 0 to 5, as there are 5 positive events). Columns (1) – (5) report the results for several dependent variables of the ability cover unexpected expenses from 100 EUR to 5000 EUR, respectively. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 4: Correlations between risk perceptions and respective previous shocks

Variables	Previous shocks
(1) Unemployment	0.401***
(2) Income risk	0.337***
(3) Long-term care	0.334***
(4) Child care expenses	0.428***
(5) Major expenses	0.216***
(6) Divorce risk	0.019
(7) Loss in asset value	0.029
(8) Career development	0.401***
(9) Income increase	0.190***
(10) Inheritance	0.136***
(11) Increase in asset value	0.271***
(12) Gift	0.189***

Notes: * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 5: Regression results survey experiment: risk perceptions and financial literacy

	(1)	(2)	(3)	(4)
Panel A:	Unemployment	Unemployment	Unemployment	Unemployment
Treated	-0.336*	-0.490***	-0.500***	-0.524***
	(0.176)	(0.154)	(0.153)	(0.151)
Financial literacy				-0.292***
				(0.086)
Financial literacy interaction				0.166
				(0.108)
Obs	1083	1083	1083	1083
Panel B:	Income risk	Income risk	Income risk	Income risk
Treated	-0.271	-0.338**	-0.342**	-0.359**
	(0.169)	(0.152)	(0.151)	(0.151)
Financial literacy				-0.276***
				(0.089)
Financial literacy interaction				0.278**
				(0.116)
Obs	1153	1153	1153	1153
Panel C:	Long-term care	Long-term care	Long-term care	Long-term care
Treated	0.117	0.056	0.067	0.054
	(0.165)	(0.153)	(0.152)	(0.152)
Financial literacy				-0.151*
				(0.079)
Financial literacy interaction				0.079
				(0.109)
Obs	1160	1160	1160	1160
Panel D:	Child care expenses	Child care expenses	Child care expenses	Child care expenses
Treated	-0.079	0.003	-0.004	-0.004
	(0.183)	(0.166)	(0.163)	(0.163)
Financial literacy				0.030
				(0.082)
Financial literacy interaction				-0.086
				(0.108)
Obs	1032	1032	1032	1032
Panel E:	Major expenses	Major expenses	Major expenses	Major expenses
Treated	0.116	0.034	0.029	0.021
	(0.158)	(0.155)	(0.155)	(0.154)
Financial literacy				-0.174**
				(0.078)
Financial literacy interaction				0.199*
				(0.112)

Obs	1215	1215	1215	1215
Panel F:	Divorce risk	Divorce risk	Divorce risk	Divorce risk
Treated	-0.316**	-0.314**	-0.311**	-0.314**
	(0.135)	(0.138)	(0.138)	(0.137)
Financial literacy				-0.092
				(0.075)
Financial literacy interaction				-0.099
				(0.099)
Obs	1058	1058	1058	1058
Panel G:	Loss in asset value	Loss in asset value	Loss in asset value	Loss in asset value
Treated	-0.170	-0.145	-0.146	-0.153
	(0.129)	(0.134)	(0.134)	(0.133)
Financial literacy				-0.041
				(0.073)
Financial literacy interaction				-0.075
				(0.095)
Obs	1099	1099	1099	1099
Panel H:	Career development	Career development	Career development	Career development
Treated	-0.205	-0.260	-0.254	-0.260
	(0.193)	(0.166)	(0.163)	(0.162)
Financial literacy				-0.158**
				(0.080)
Financial literacy interaction				0.227**
				(0.111)
Obs	1104	1104	1104	1104
Panel I:	Income increase	Income increase	Income increase	Income increase
Treated	-0.250	-0.250*	-0.244	-0.257*
	(0.173)	(0.151)	(0.151)	(0.151)
Financial literacy				-0.193**
				(0.075)
Financial literacy interaction				0.167*
				(0.099)
Obs	1144	1144	1144	1144
Panel J:	Inheritance	Inheritance	Inheritance	Inheritance
Treated	-0.111	-0.136	-0.136	-0.143
	(0.156)	(0.150)	(0.150)	(0.150)
Financial literacy				-0.154**
				(0.073)
Financial literacy interaction				0.093
				(0.105)
Obs	1184	1184	1184	1184
Panel K:	Increase in asset value	Increase in asset value	Increase in asset value	Increase in asset value
Treated	-0.128	-0.128	-0.115	-0.116

	(0.164)	(0.153)	(0.152)	(0.152)
Financial literacy				-0.002
				(0.073)
Financial literacy interaction				-0.056
				(0.110)
Obs	1138	1138	1138	1138
Panel L:	Gift	Gift	Gift	Gift
Treated	-0.026	-0.049	-0.038	-0.063
	(0.150)	(0.149)	(0.146)	(0.146)
Financial literacy				-0.214***
				(0.077)
Financial literacy interaction				-0.004
				(0.107)
Obs	1175	1175	1175	1175
Household and personal controls		YES	YES	YES
Heterogeneous treatment effects			YES	YES
Financial knowledge index control and interaction				YES

Notes: This table shows treatment effects on the likelihood of different negative and positive shocks as estimated by population weighted regressions. Column (1) shows the treatment effect of our randomized treatment. Column (2) shows treatment effects when employing additional controls for personal and household level characteristics. Column (3) shows average treatment effects additionally allowing for the treatment effect to be heterogeneous across all personal and household level controls, i.e. all interactions included. Column (4) shows the treatment interaction coefficient with the financial literacy knowledge index. All covariates are demeaned to ensure our main coefficient captures the average effect as proposed by Imbens and Rubin (2015). Robust standard errors are in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Appendix

Appendix A.1 Financial Literacy Questions

Seven questions used for the OECD/INFE financial literacy score, calculated as the total number of correctly answered questions:[10]

1. Imagine that five brothers are given a gift of EUR 1,000 in total and have to share the money equally. Now imagine that the brothers have to wait for one year to get their share of the EUR 1,000 and inflation stays at 2%. In one year's time will they be able to buy: (a) more with their share of the money than they could today, (b) the same amount, or (c) less than they could buy today? *(correct answer: c)*

2. You lend EUR 25 to a friend one evening and he gives you EUR 25 back the next day. How much interest has he paid on this loan? *(correct answer: 0)*

3. Imagine that you put EUR 100 into a no fee savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made? *(correct answer: 102 EUR)*

4. And how much would be in the account at the end of five years? (a) More than EUR 110, (b) exactly EUR 110, (c) less than EUR 110, (d) It is impossible to tell from the information given. *(correct answer: a)*

5. Are following statements (a) true or (b) false?

    - An investment with a high return is likely to be high risk. *(correct answer: a)*
    - High inflation means that the cost of living is increasing rapidly. *(correct answer: a)*
    - It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares. *(correct answer: a)*

[10] For sake of space-saving, answer options such as "Don't know" or "Refused to answer" are omitted.

Appendix A.2 Measures of financial resilience and past financial shocks

If necessary, would you be able to cover the following unexpected one-off expenses at short notice? Yes / No / Don't know / Refused

(1) A mobile phone bill of EUR 100
(2) A new washing machine for EUR 500
(3) A dentist bill of EUR 1,000
(4) Repairing water damage for EUR 2,000
(5) A car repair for EUR 5,000

Over the last ten years, the following situations have had a negative/positive effect on my own or my household's financial situation. (multiple responses)

(1) Unemployment of a household member
(2) Unexpectedly positive career development
(3) Unexpectedly low income of a household member
(4) Unexpectedly high income of a household member
(5) Longer periods of illness or need for care of a household or family member
(6) Unexpected additional expenses for childcare
(7) Inheritance
(8) Unexpected major expenses (e.g. to repair the car, technical devices or damage of the house/apartment)
(9) Divorce or dissolution of partnership
(10) Loss in value of an important asset (e.g. house/apartment or equity funds)
(11) Gain in value of an important asset (e.g. house/apartment or equity funds)
(12) Monetary gains (e.g. lottery) or gifts

Appendix A.3 Experiment (randomization, sample split):

There may be situations in life that can negatively affect your financial situation. I will now read some examples to you.

Version A: In your opinion, how likely is it that a **household, which is similar to yours**, experiences the following situations over the next ten years? Please rate the likelihood of such a situation occurring on a scale from one ((almost) impossible to occur) to ten (will (almost) certainly occur).

Version B: In your opinion, how likely is it that **your household** experiences the following situations over the next ten years? Please rate the likelihood of such a situation occurring on a scale from one ((almost) impossible to occur) to ten (will (almost) certainly occur).

(1) Unemployment of a household member
(2) Unexpectedly low income of a household member
(3) Longer periods of illness or need for care of a household or family member
(4) Unexpected additional expenses for childcare
(5) Unexpected major expenses (e.g. to repair the car, technical devices or damage of the house/apartment)
(6) Divorce or dissolution of partnership
(7) Loss in value of an important asset (e.g. house/apartment or equity funds

There may be situations in life that can positively affect your financial situation. I will now read some examples to you.

Version A: In your opinion, how likely is it that a **household, which is similar to yours**, experiences the following situations over the next ten years? Please rate the likelihood of such a situation occurring on a scale from one ((almost) impossible to occur) to ten (will (almost) certainly occur).

Version B: In your opinion, how likely is it that **your household** experiences the following situations over the next ten years? Please rate the likelihood of such a situation occurring on a scale from one ((almost) impossible to occur) to ten (will (almost) certainly occur).

(1) Unexpectedly positive career development

(2) Unexpectedly high income of a household member

(3) Inheritance

(4) Gain in value of an important asset (e.g. house/apartment or equity fund)

(5) Monetary gains (e.g. lottery) or gifts

Appendix A.4 Financial literacy and socio-demographic characteristics

Table A.1: Financial literacy and socio-demographic characteristics

	Share (%)	Mean knowledge score (0 to 7)	Do not know score (0 to 7)
15-29	18.35	4.99	0.74
30-44	23.83	5.38	0.45
45-59	28.06	5.43	0.53
60+	29.76	5.36	0.67
Male	48.20	5.56	0.40
Female	51.80	5.09	0.77
Primary	13.87	4.29	1.28
Lower secondary	39.39	5.29	0.56
Upper secondary	36.80	5.52	0.47
Tertiary	9.94	6.13	0.17
Single	24.64	5.16	0.62
Married/partner	54.85	5.49	0.51
Divorced/living alone	13.80	5.24	0.57
Widowed/no partner	6.70	4.68	1.13
Fulltime	49.03	5.56	0.36
Parttime	9.67	4.89	0.85
Unemployed	4.13	4.80	0.95
Retired	28.38	5.31	0.70
Other	8.79	4.71	1.09
Austria	91.48	5.33	0.57
Born outside Austria	8.52	5.14	0.74
Income missing	17.61	5.05	0.85
0-900 EUR	3.53	5.02	1.03
900-1350 EUR	8.50	4.92	0.84
1350-1650 EUR	6.72	5.38	0.52
1650-1950 EUR	8.10	5.05	0.61
1950-3000 EUR	24.34	5.41	0.55
3000 EUR +	31.20	5.60	0.36
Overall	100.00	5.32	0.59

Notes: Column 2 reports the share of each subgroup of the socio-demographic variables. Mean knowledge score and don't know score of the financial knowledge are reported in Column 3 and 4, respectively.

Appendix A.5 Financial resilience and experience of specific past financial shocks

Table A.2: Financial resilience and previous experience of economic shocks

	(1)	(2)	(3)	(4)	(5)
	Can afford unexpected 100	Can afford unexpected 500	Can afford unexpected 1000	Can afford unexpected 2000	Can afford unexpected 5000
Unemployment	0.014	-0.097**	-0.173***	-0.170***	-0.094**
	(0.021)	(0.042)	(0.045)	(0.042)	(0.037)
Income risk	-0.023	-0.065*	-0.047	-0.058	-0.083**
	(0.026)	(0.039)	(0.042)	(0.041)	(0.038)
Long-term care	0.020	0.062**	-0.001	-0.090**	-0.097***
	(0.016)	(0.026)	(0.034)	(0.037)	(0.036)
Child care expenses	-0.012	-0.005	-0.020	0.051	0.008
	(0.018)	(0.028)	(0.033)	(0.036)	(0.040)
Major expenses	0.019*	0.036**	0.037	-0.023	-0.020
	(0.011)	(0.018)	(0.022)	(0.025)	(0.026)
Divorce risk	-0.011	-0.018	-0.075*	-0.037	-0.070*
	(0.029)	(0.039)	(0.042)	(0.042)	(0.041)
Loss in asset value	0.010	0.042	0.112*	0.045	0.132*
	(0.030)	(0.048)	(0.060)	(0.055)	(0.068)
Career development	0.041***	-0.014	0.008	0.035	0.083*
	(0.014)	(0.036)	(0.042)	(0.047)	(0.044)
Income increase	0.003	0.064	0.123**	0.160**	0.137*
	(0.023)	(0.059)	(0.062)	(0.068)	(0.077)
Inheritance	0.019	0.051*	0.086**	0.051	0.076
	(0.017)	(0.031)	(0.042)	(0.046)	(0.047)
Increase in asset value	-0.006	0.005	0.074*	0.064	0.018
	(0.014)	(0.033)	(0.039)	(0.055)	(0.063)
Gift	0.024	0.011	0.020	0.028	0.080*
	(0.021)	(0.038)	(0.044)	(0.048)	(0.046)
Financial literacy	0.015**	0.029***	0.050***	0.059***	0.051***
	(0.006)	(0.011)	(0.012)	(0.011)	(0.011)
Financial literacy don't know	0.002	0.003	-0.003	0.001	0.011
	(0.009)	(0.014)	(0.016)	(0.016)	(0.014)
Household and personal controls	YES	YES	YES	YES	YES
Obs	1418	1418	1418	1418	1418

Notes: This table shows financial resilience on negative and positive previous shocks. Column (1) – (5) reports the results of each dependent variable of the ability cover unexpected expenses 100 – 5000 Euro, respectively.

* Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Appendix A.6 Randomization tests

Table A.3: Logit regression of treatment assignment

	(1)
Age 30-44	0.009
	(0.17)
Age 45-59	0.027
	(0.51)
Age 60+	-0.055
	(-0.72)
Female	-0.001
	(-0.04)
Lower secondary education	0.025
	(0.52)
Upper secondary education	0.060
	(1.19)
Tertiary education	0.056
	(0.87)
Married/partner	-0.130*
	(-2.37)
Divorced/living alone	-0.034
	(-0.63)
Widowed/no partner	0.013
	(0.18)
Parttime	0.053
	(0.97)
Unemployed	-0.021
	(-0.25)
Retired	0.113
	(1.70)
Other	-0.061
	(-0.91)
income missing	-0.043
	(-0.94)
income 0-900 EUR	0.085
	(0.89)
income 900-1350 EUR	0.030
	(0.41)
income 1350-1650 EUR	0.107
	(1.49)
income 1650-1950 EUR	0.118
	(1.83)
income 1950-3000 EUR	0.073
	(1.73)
income 3000+ EUR	0.000
	(.)
Born outside Austria	-0.020
	(-0.38)
2 person hh	0.106
	(1.78)
3 person hh	0.103
	(1.51)
4 person hh	0.151
	(1.95)
5+ person hh	-0.008
	(-0.08)
3000-5000	-0.002
	(-0.04)
5000-1 Mio	-0.040
	(-1.06)
1 Mio+	-0.079
	(-1.73)
Obs	1418

Notes: The table shows the results of a logit regression of treatment assignment on observable characteristics.
* Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table A.4: Answers to perceptions of financial risks

	1	2	3	4	5	6	7	8	9	10	No answer	Does not apply	Don't know
Unemployment (treatment)	26.6	8.9	9.4	7.0	11.9	4.2	3.7	4.3	1.8	3.6	1.1	11.0	6.6
Unemployment (control)	31.2	8.2	8.2	6.1	9.1	3.5	2.3	4.2	1.9	2.8	0.6	16.8	5.0
Income risk (treatment)	28.6	10.7	11.9	5.5	11.3	4.4	3.9	3.0	2.1	3.5	0.9	8.0	6.4
Income risk (control)	33.4	9.7	10.1	5.9	7.7	4.4	3.2	3.2	1.9	2.8	0.7	12.6	4.4
Long-term care (treatment)	15.8	10.9	11.8	6.0	17.5	7.0	5.1	4.0	4.4	2.5	1.8	2.1	11.3
Long-term care (control)	17.5	7.9	10.3	5.6	15.5	7.0	5.6	5.7	3.5	3.3	1.2	6.1	10.8
Child care expenses (treatment)	34.0	6.0	5.5	5.2	6.9	3.7	4.6	4.1	2.2	1.5	1.3	20.5	4.6
Child care expenses (control)	36.5	8.6	5.2	3.6	5.1	3.9	4.5	4.9	1.5	2.5	1.4	19.3	2.9
Major expenses (treatment)	9.2	6.2	9.1	9.4	20.1	7.8	9.1	10.1	4.2	3.1	1.3	3.2	7.3
Major expenses (control)	8.8	6.9	7.8	9.2	16.5	6.7	10.2	11.0	3.8	4.1	1.8	4.9	8.4
Divorce risk (treatment)	41.7	10.8	10.6	4.0	4.9	2.0	2.0	0.9	0.5	1.7	2.2	14.2	4.4
Divorce risk (control)	43.3	11.3	9.0	2.6	3.0	1.1	0.5	1.0	0.8	1.1	2.1	18.7	5.6
Loss in asset value (treatment)	42.3	13.3	9.3	4.1	4.9	1.4	1.6	0.6	0.9	1.9	1.6	11.8	6.3
Loss in asset value (control)	41.1	13.1	10.4	4.4	2.4	1.8	0.9	1.2	0.6	0.7	1.9	15.9	5.5
Career development (treatment)	24.4	7.9	9.0	5.6	11.4	6.4	6.7	5.2	2.5	3.6	1.3	9.7	6.4
Career development (control)	28.5	8.0	7.7	3.2	10.4	5.0	3.4	6.5	2.5	4.2	0.8	14.2	5.5
Income increase (treatment)	33.5	9.5	7.9	7.1	9.6	4.5	5.0	3.5	1.9	2.8	1.4	7.1	6.2
Income increase (control)	33.9	10.9	7.6	4.8	8.7	4.0	3.4	3.5	2.1	1.5	1.5	12.1	6.0
Inheritance (treatment)	39.3	11.1	11.8	4.7	6.0	3.9	2.2	3.7	1.3	2.3	1.7	5.3	6.8
Inheritance (control)	41.9	9.5	7.4	6.3	7.5	3.0	2.4	2.1	1.3	2.2	1.2	9.5	5.7
Increase in asset value (treatment)	39.6	8.9	8.5	6.1	5.5	4.7	2.7	4.0	1.3	1.5	1.5	9.3	6.5
Increase in asset value (control)	39.9	10.1	8.1	3.5	6.6	3.5	2.6	2.7	1.5	1.7	0.9	13.3	5.5
Gift (treatment)	34.7	15.6	10.4	4.5	8.7	3.7	1.9	3.4	1.3	1.7	1.4	4.1	8.6
Gift (control)	34.8	12.0	12.9	4.9	6.6	3.8	2.7	3.0	0.8	1.6	0.9	7.2	8.7

Table A.5: Robustness: Perceptions of financial risks of subsamples

	(1)	(2)	(3)	(4)
Panel A:	Unemployment	Unemployment	Unemployment	Unemployment
Treated	-0.252	-0.380**	-0.393**	-0.436**
	(0.195)	(0.179)	(0.176)	(0.174)
Financial literacy				-0.352***
				(0.094)
Financial literacy interaction				0.190
				(0.119)
Obs	753	753	753	753
Panel B:	Income risk	Income risk	Income risk	Income risk
Treated	-0.053	-0.199	-0.197	-0.228
	(0.200)	(0.182)	(0.181)	(0.179)
Financial literacy				-0.385***
				(0.100)
Financial literacy interaction				0.362***
				(0.132)
Obs	800	800	800	800
Panel C:	Child care expenses	Child care expenses	Child care expenses	Child care expenses
Treated	0.744*	0.723*	0.733**	0.755**
	(0.390)	(0.378)	(0.368)	(0.369)
Financial literacy				-0.242
				(0.166)
Financial literacy interaction				0.394
				(0.260)
Obs	237	237	237	237
Panel D:	Divorce risk	Divorce risk	Divorce risk	Divorce risk
Treated	-0.128	-0.227	-0.230	-0.241*
	(0.159)	(0.148)	(0.144)	(0.143)
Financial literacy				-0.290***
				(0.096)
Financial literacy interaction				0.175
				(0.122)
Obs	667	667	667	667
Panel E:	Loss in asset value	Loss in asset value	Loss in asset value	Loss in asset value
Treated	-0.116	-0.116	-0.149	-0.182
	(0.233)	(0.245)	(0.231)	(0.243)

Financial literacy				-0.179
				(0.216)
Financial literacy interaction				0.203
				(0.251)
Obs	268	268	268	268
Panel F:	Career development	Career development	Career development	Career development
Treated	0.072	-0.104	-0.083	-0.108
	(0.227)	(0.207)	(0.201)	(0.199)
Financial literacy				-0.239***
				(0.092)
Financial literacy interaction				0.288**
				(0.135)
Obs	719	719	719	719
Panel G:	Income increase	Income increase	Income increase	Income increase
Treated	-0.070	-0.132	-0.122	-0.148
	(0.208)	(0.189)	(0.189)	(0.189)
Financial literacy				-0.246**
				(0.098)
Financial literacy interaction				0.211*
				(0.128)
Obs	760	760	760	760
Panel H:	Increase in asset value	Increase in asset value	Increase in asset value	Increase in asset value
Treated	-0.041	0.208	0.132	0.153
	(0.369)	(0.378)	(0.371)	(0.375)
Financial literacy				0.141
				(0.257)
Financial literacy interaction				-0.207
				(0.335)
Obs	249	249	249	249
Household and personal controls		YES	YES	YES
Heterogeneous treatment effects			YES	YES
Financial knowledge index control and interaction				YES

Notes: This table shows treatment effects on the likelihood of different negative and positive shocks as estimated by population weighted regressions in subsamples. Panel A and F: only employed/in labor force; partner in 2 persons household employed / in labor force; Panel B and G: exclude pensioners; Panel C: household with kids below 18; Panel D: married; Panel

E and H: household has risky assets. Column (1) shows the pure treatment effect of our randomized treatment. Column (2) shows treatment effects when employing additional controls for personal and household level characteristics. Column (3) shows average treatment effects additionally allowing for the treatment effect to be heterogeneous across all personal and household level controls, i.e. all interactions included. Column (4) shows the treatment interaction coefficient with the financial literacy knowledge index. All covariates are demeaned to ensure our main coefficient captures the average effect as proposed in Imbens and Rubin (2015). Robust standard errors are in parentheses.

* Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

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