# Status, Control Beliefs, and Risk-Taking*

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**Abstract**

We show that relative standing in the wealth distribution shapes individuals' willingness to take risks. Using a large-scale representative survey, we manipulated respondents' perceived relative standing by randomly varying the range of response categories when asking about their wealth level. Respondents who are induced to perceive their relative wealth as low display more tolerance towards risk in a subsequent incentivized lottery task. This effect is mainly driven by individuals who more firmly believe that life outcomes are beyond their control. This heterogeneity in individual-specific beliefs highlights the benefits of incorporating personality constructs into economic analysis.

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# 1 Introduction

Relative consumption and wealth are essential components of well-being. A voluminous literature, dating back at least to Veblen (1899) and Duesenberry (1949), has accumulated evidence that people care not only about absolute outcomes but also their relative position. Relative concerns are inevitably intertwined with individuals' willingness to take risks and have far-ranging implications for a host of economic issues, such as asset pricing, economic growth, monetary policy, savings behavior, income inequality, taxation, job performance and satisfaction, and well-being.[1] Understanding the relativistic foundation of risk preferences is therefore essential to predicting behavioral responses to relative concerns across domains. Yet, empirical evidence on this relativistic foundation remains scarce.

The first contribution of our study is to present representative evidence of the causal link from relative wealth to risk-taking. Intuitively, individuals' concern about their status in the wealth distribution should motivate risk-taking when there is a chance to improve one's relative standing, even if this improvement is minimal. The relative attractiveness of choices that entail different degrees of risk may depend on the decision maker's initial position and taste for relative improvements. Recent theoretical work made progress in modeling the interdependence between relative concerns and risk-taking by explicitly incorporating considerations for status and rank into the utility function (Robson, 1996; Becker et al., 2005; Ray and Robson, 2012). Most of this work confirms the Friedman-Savage conjecture that risk-taking mainly occurs in the middle of the distribution where status gains are likely substantial.[2] Newer work, on the other hand, predicts that risk-taking happens at the bottom of the distribution, where rewards from risk-taking can be significant (Kuziemko et al., 2014; Hopkins, 2018). Our findings challenge the theoretical predictions in the tradition of Friedman and Savage (1948) and instead suggest a concentration of risk-taking at the lower end of the distribution.

The second contribution we make is to delve deeper into the proposed relationship and to identify the type of individuals who are particularly likely to respond to their relative standing with increased risk-taking. To do so, we borrow from personality psychology and focus on locus of

[1] See for example, Frank (1985); Abel (1990); Gali (1994); Carroll et al. (2000); Ljungqvist and Uhlig (2000); Hopkins and Kornienko (2004); Luttmer (2005); Fliessbach et al. (2007); Card et al. (2012); Cohn et al. (2014); Perez-Truglia (2020); Michaillat and Saez (2021).

[2] In an early attempt to rationalize why people are both willing to buy lottery tickets and insurance plans, Friedman and Savage (1948) proposed and introduced a theoretical relationship between wealth rank and risk-taking behavior. They construct a utility function with concave and convex parts; such that large enough gambles might induce people to accept risk to move up the wealth distribution. Gregory (1980) has illustrated how relative comparisons can rationalize Friedman and Savage's argument.

control (LoC), which is the individual disposition to perceive life outcomes as within one's control or, alternatively, as predominantly the result of luck or fate (Rotter, 1966). Our focus on LoC is motivated by existing evidence on its relationship with relative comparisons and inequality, which we discuss in more detail below. We show that this individual-specific belief system moderates the relationship between relative standing and risk-taking, and other non-cognitive skills, emotions, and socio-economic factors do not play a role.

We face two major empirical challenges in credibly testing the impact of relative standing on risk preferences in the field. First, varying levels of risk aversion are likely to result in fundamentally different wealth accumulation outcomes, to begin with. Second, it is difficult, if not impossible, to create exogenous variation in relative wealth. We address these challenges in two ways. First, we implement a tailor-made survey module in the Innovation Sample of the Socio-Economic Panel (SOEP-IS), a representative longitudinal study of the German population. Our module includes a *pre-treatment* measure of locus of control and an incentivized measurement of individual risk-taking. Measuring LoC before the intervention allows us to analyze heterogeneous responses to our treatment. Second, our strategy to create the necessary exogenous variation in relative wealth in this setting is to induce a temporary shift in respondents' *perceived* relative standing in the wealth distribution. To do so, we take advantage of the fact that most people have to infer their relative wealth rank from their limited information on the distribution of income and wealth and that these perceptions are easily malleable.[3]

Specifically, we ask respondents about their net wealth and randomize the response categories. We assign half of the respondents to response categories with wide intervals, e.g., the lowest category ranges up to the 80th percentile of the net wealth distribution (treatment condition). The other half of respondents receive response categories with small intervals, with the lowest category ranging up to the 20th percentile and the highest category starting at the 60th percentile (control condition). To illustrate the underlying idea, consider, for example, a group of respondents with the same objective wealth level that would place them into the 60th percentile. Respondents in the control condition would end up in the highest category, whereas respondents in the treatment condition would end up in the lowest category. Consequently, the randomization of response categories ensures that the objective income and wealth distribution is the same across treatment

[3]Evidence, for example for the US, suggests that individuals have limited knowledge about the wealth distribution and systematically underestimate wealth inequality (Norton and Ariely, 2011). Related, people tend to underestimate their relative income rank nationally and globally but adjust these beliefs in response to information about their actual ranks (e.g., Cruces et al., 2013; Karadja et al., 2017; Fehr et al., 2022b,a).

and control while creating exogenous variation in perceived relative standing. If people are induced to feel that their wealth is at the lower end of the distribution and further away from the top, they will display different risk-taking behavior than when they do not perceive their relative wealth as low. We think of this variation in perceptions as a tool to isolate a temporary change in risk-taking that helps us to illustrate the theoretical linkage between relative concerns and risk preferences.

Our "first-stage" results confirm the intended variation in perceived relative standing. The wider wealth intervals in the treatment condition led the overwhelming majority of respondents to locate themselves at the lower end of the distribution. Treated respondents also perceive a more significant gap to the top. Focusing on relative income to minimize possible anchoring and demand effects, we show that they estimate a 29 percent higher household income threshold for being richer than 90 percent of others compared to non-treated respondents. We complement this "first-stage" evidence with a manipulation check using a different study sample to show that the intervention affects relative wealth perceptions but not other perceptions and affective states. This manipulation check demonstrates that treated respondents think their wealth situation is worse compared to other households and they rank lower in the wealth distribution than non-treated respondents (and are thus less affluent than others) and that the treatment shifts the perceived wealth level at the top but not in the middle of the distribution. Moreover, we are able to rule out alternative mechanisms through which our treatment may affect risk-taking, such as short-term fluctuations in positive and negative affective states and absolute wealth perceptions. Together, this presents strong evidence that the treatment solely shifts perceptions of relative standing in the wealth distribution.

We present two main findings. First, we find that our intervention translates into a sizable treatment effect. That is, respondents are more likely to take risks when they are induced to perceive their relative standing as low. As is standard in the literature, we estimate individual-level utility function parameters assuming constant relative risk aversion (CRRA). The estimated CRRA parameter $\rho$ is about 0.5 lower among treated respondents, corresponding to a shift of 19 percent relative to the control group mean and implying less risk aversion. This result is robust to alternative outcome specifications and the functional form of utility. The lower risk aversion among respondents with a low perceived relative standing resonates well with recent theoretical models predicting risk-taking at the bottom of the distribution—for example, Hopkins (2018) models relative concern as a competition for societal rewards. Rewards are allocated according to spending on conspicuous consumption, which makes fair gambles particularly attractive for individuals at the lower end of the initial wealth distribution. Taking more risk is their only option for rising in

the wealth hierarchy.

Second, the temporary shift in risk-taking is driven by respondents' beliefs about their control over life outcomes (locus of control). Two pieces of existing evidence point to the importance of this belief system in shaping the response to relative standing. First, psychological research indicates that people who do not believe they have control over life outcomes – i.e., those with an *external* locus of control – tend to generally have a higher interest in relative comparisons (e.g., Testa and Major, 1990; Aspinwall and Taylor, 1993; Buunk and Gibbons, 2007; Fiske, 2011). We present direct evidence of this positive relationship between external control beliefs and interest in relative comparisons using data from the SOEP. Given that external control beliefs are negatively correlated with a range of important life outcomes, this may, in part, reflect that the well-being of internal individuals, who enjoy better outcomes in other domains of life, is less dependent on favorable relative comparisons.[4] Second, data from the World Value Survey shows that risk aversion is lower in countries with greater income inequality. Importantly, this relationship is more pronounced among people with external control beliefs, but not people with internal control beliefs.

Consistent with this correlational evidence, we show that the heterogeneity in control beliefs drives the relationship between low relative standing and risk-taking. We find that respondents who are more inclined to believe that life outcomes are a matter of luck and fate substantially increase their risk-taking, as predicted. In contrast, respondents believing in having control over their lives do not respond to our treatment. The effect is sizable, with a one standard deviation increase in external control beliefs shifting the estimated risk parameter $\rho$ by an additional 0.9 towards less risk aversion. Moreover, we can address a host of alternative explanations for this result. In particular, we find no evidence that locus of control merely picks up other facets of personal characteristics. Personality traits (Big 5, self-control, and optimism), emotions, and socio-demographic characteristics do not moderate the observed relationship.

**Related Literature** Given the central role risk preferences play in economic analyses, it is not surprising that their origin has been the target of empirical investigation before. A nascent literature focuses on the lasting effects of aperiodic personal experiences such as natural disasters (e.g., Eckel et al., 2009; Cameron and Shah, 2015; Hanaoka et al., 2018), macroeconomic crises (e.g., Malmendier

[4]Growing evidence suggests that, like other non-cognitive skills, locus of control is strongly associated with several important life outcomes. For example, more internal beliefs tend to be positively correlated with subjective health, life satisfaction, educational attainment, investment in work-related training, and labor market outcomes (Coleman and DeLeire, 2003; Heckman et al., 2006; Barón and Cobb-Clark, 2010; Heckman and Kautz, 2012; Becker et al., 2012; Cobb-Clark, 2015; Caliendo et al., 2015, 2022).

and Nagel, 2011; Cohn et al., 2015) or violence (e.g., Voors et al., 2012; Callen et al., 2014; Jakiela and Ozier, 2019; Brown et al., 2019) on risk preferences. A few other studies investigate short-term fluctuations in attitudes towards risk that are triggered by reoccurring economic and psychological phenomena such as day-to-day income fluctuations (Akesaka et al., 2023) and emotions (Meier, 2022).[5] Our study places in between these two lines of research. We complement the literature on violence, crisis, and disaster by explicitly focusing on the impact of a more familiar and natural experience, namely the relative position of individuals in the economic hierarchy of society. To the extent that relative comparisons are frequent, their impact on choices is less transient than, for example, the impact of emotional states.

A handful of studies show that social comparison affects decision under uncertainty in laboratory and lab-in-the-field experiments (Kuziemko et al., 2014; Fafchamps et al., 2015; Dijk, 2017; Gamba et al., 2017; Kirchler et al., 2018; Schwerter, 2023).[6] The experiments in this literature let participants make risky decisions involving their laboratory earnings and randomly vary whether the earnings or relative ranking of other participating peers are observed or not. While this stimulates social comparisons, it tightly links the nature of the social comparison to the elicitation method of risk preferences. In contrast, we can strictly separate the risk task from manipulating perceived relative standing by embedding our treatment into a simple question about background household wealth. This mitigates concerns about experimenter demand effects and does not need to rely on randomly assigned income ranks but endogenously creates social comparisons concerning individuals' standing in the economic hierarchy of society. In this way, our experimental design is related to Haisley et al. (2008), who show that low-income individuals are more inclined to buy lottery tickets if they are primed to think that their relative income is low. Our study moves beyond this literature on social comparisons by using a large representative sample and highlighting that similar dynamics can originate from a *perceived* relative disadvantage in background household wealth. Moreover, we unveil a mechanism behind this relationship and show that enduring and individual-specific beliefs are key in shaping responses to relative concerns.

The latter issue ties into recent efforts to incorporate personality traits into economic analysis with greater rigor (Borghans et al., 2008; Almlund et al., 2011; Heckman et al., 2021). While a current

[5] See Chuang and Schechter (2015) and Schildberg-Hörisch (2018) for a recent review of the literature on variation in (risk) preferences over time.

[6] The study also relates to a growing literature on aspirations (see La Ferrara 2019, and Genicot and Ray 2020, for reviews). Aspirations are relative in nature, as comparisons to others significantly inform individual desires and goals. In this sense, aspirations and reference points may encourage risk-taking (Ray and Robson, 2012; Genicot and Ray, 2020; Dohmen et al., 2021; Alaoui and Penta, 2022; Pickard et al., 2023).

debate in this field is whether preferences and personality traits are complements or substitutes in explaining economic behavior (Becker et al., 2012; Jagelka, 2020), we focus on how individual-specific beliefs moderate social factors that shape risk preferences. In a related fashion, other work has shown that LoC is related to prosocial behavior (Andor et al., 2022), job search (Caliendo et al., 2015), job training (Caliendo et al., 2022), and investment decisions (Pinger et al., 2018). Our findings illustrate that psychological primitives can be essential in explaining heterogeneity in risk preferences.

## 2 Research Design

We run our study in the German Socio-Economic Panel (SOEP), a nationally representative longitudinal study of German households (see Goebel et al., 2018, for more details). The SOEP includes an Innovation Sample (SOEP-IS) comprising several independent and representative samples. Researchers can propose their own modules in one or more of these samples. Participating households in the SOEP-IS are surveyed yearly, and all household members above age 16 are interviewed in computer-assisted face-to-face interviews by professional interviewers. This has unique advantages over other frequently used survey modes (e.g., phone and online surveys), as it minimizes non-response and misunderstandings and prevents information look-up and communication within households (for more detailed information, see Richter and Schupp, 2015).

### 2.1 Design of the Survey Module and Measures

Our survey module in the SOEP-IS consists of three parts: questions on locus of control, treatment manipulation, and a lottery task to measure risk preferences (see the Appendix for the full details of the survey module).

**Locus of Control.** In the first part of our survey module, we elicit our personality construct of interest, locus of control (LoC), which expresses the extent to which someone believes that life events are under their control (Rotter, 1966). LoC forms early in life and has a significant degree of short- and medium-term stability (Cobb-Clark and Schurer, 2013; Fitzenberger et al., 2021). We implemented the same ten routinely used items in the SOEP (Nolte et al., 1997). For each item, respondents had to agree or disagree with statements such as *"the course of my life is depending on me"* and *"which opportunities I have in life is determined by social conditions"*, using a Likert-scale ranging

from 1 (disagree completely) to 7 (agree completely).[7] In addition, we measure optimism with two questions: a general question about optimism regarding the future (on a 4-point scale) taken from the SOEP and a question about the likelihood of experiencing specific events, such as financial gains, career success, or illness, relative to an average person (on a 7-point scale). This measure serves as a control, as risk aversion is typically associated with a less optimistic outlook. Following prior studies (Specht et al., 2013; Cobb-Clark and Schurer, 2013), we use the unweighted average of seven of the ten items of our LoC measure as a single index for LoC beliefs. Each item is coded such that higher values correspond to a more external LoC. While using a single measure for LoC makes the interpretation more straightforward, other measures differentiate explicitly between external and internal LoC scores. As discussed in more detail in Section 4.3, our heterogeneity results do not depend on the choice of constructing the measure for LoC.

**Treatment Manipulation.** The second part contains our treatment manipulation. We aim to induce variation in the perceived relative standing in the wealth distribution by asking respondents about their net wealth and varying the response scale of the question. This manipulation builds on research showing that response scales inevitably carry information about the population distribution. In particular, psychological and survey research suggests that respondents use their location on the scale to determine their place in the distribution (e.g., Schwarz et al., 1985; Rockwood et al., 1997; Menon et al., 1997; Bertrand and Mullainathan, 2001). We explain the concept of net wealth and ask respondents to indicate their net wealth using five predefined wealth categories. We randomly vary the range of available response categories (see Table 1). Half of the respondents receive categories with wide intervals (treatment condition), i.e., *less than €275,000; €275,001 to €468,000; €468,001 to €722,000; €722,001 to €989,000; more than €989,000*. The other half of respondents are assigned to the control condition with much smaller intervals, i.e., *less than €2,500; €2,501 to €11,000; €11,001 to €27,000; €27,001 to €112,000; more than €112,000*.[8] The lowest interval in the treatment condition covers 80 percent of the German net wealth distribution, implying that most respondents should locate themselves at the lower end of the wealth distribution. In contrast, the responses in the control condition should be more concentrated in the middle and top categories. Therefore, the treatment induces respondents to perceive their relative wealth as low and further

[7] For an overview over the wording of each item and the construction of the LoC scale, see Table A2.

[8] We constructed the intervals based on the most recent data on the German wealth distribution at the time of the survey. The upper bounds of the intervals correspond to the 20th, 30th, 40th, and 60th percentile of the distribution in the control condition and the 80th, 90th, 95th, and 97th percentile in the treatment condition. The median net wealth in 2014 was 60,400 euros, while the average was 214,500 (see HFCS, Deutsche Bundesbank, 2016, for more information).

away from the top, which is not the case in the control condition.

**Risk-Elicitation Task.** Directly after the wealth categorization, respondents participate in a risk-preference elicitation task. We use a choice set that requires respondents to make a single choice from a set of six gambles (Binswanger, 1980; Eckel and Grossman, 2002). Each gamble has an equal chance of yielding a low or a high payoff. While the first gamble guarantees respondents a payoff of €50, the remaining gambles gradually decrease the low payoff and increase the high payoff (see Table A1). The lotteries gradually increase in expected value but also in the implicit level of risk (standard deviation). This task is easy to understand and, therefore, well suited for eliciting risk preferences in a general population sample (Dave et al., 2010; Charness et al., 2013), yet still rich enough to obtain detailed utility information.[9] We incentivized the task by randomly selecting one in ten respondents and paying them the outcome of their chosen gamble.

**Discussion of the Design.** Our design relies on a shift in perceived relative standing in the wealth distribution to identify the causal link from relative wealth to risk-taking. A common aspect of this type of variation is that changes in perceptions *and* behavior are rather short-lived (e.g., Cavallo et al., 2017; Bottan and Perez-Truglia, 2022).[10] However, this is sufficient for our purpose as the theoretical models are agnostic about the temporal implications of relative concerns, and we are primarily interested in isolating the causal relationship between relative concerns and risk-taking. In addition, the treatment manipulation offers other advantages that are worth highlighting. First, we intentionally use a subtle manipulation and abstain from providing more explicit information about wealth ranks to minimize the risk of inducing experimenter demand effects (Haaland et al., 2023). Second, the random assignment to the two conditions ensures that the actual distribution of income and wealth is, on average, the same in both groups, thus keeping absolute wealth levels constant. Third, respondents receive information about the wealth distribution in the control and treatment groups. Consequently, the treatment variation comes from differences in this information and is orthogonal to prior perceptions about relative wealth and other unobserved and observed individual characteristics. This is also important for analyzing heterogeneity in LoC as perceived relative wealth may depend on individual characteristics (such as LoC).

[9] A comprehension check after the risk elicitation task revealed that about 89 percent of respondents rated the comprehensibility of the risk-elicitation task as good or very good, and only 2 percent of respondents as insufficient or unintelligible.

[10] The pass-through rate of information on beliefs is typically substantially lower than the Bayesian benchmark and fades out within a short time frame. Given that effect sizes of behavior are usually smaller than effect sizes on belief updating, we do not expect that changes in risk-taking are permanent (see Haaland et al., 2023, for a review).

The design also allows us to analyze how heterogeneity in LoC influences the responses to the treatment. For this purpose, we placed the elicitation of LoC before the intervention to avoid imbalances in LoC driving the results and ruling out the possibility that the intervention influenced responses to the LoC questions. Based on evidence from the World Value Survey, we hypothesized that more external-oriented people react more strongly to relative concerns (see Appendix Section A.1).

## 2.2 Data

**Setting and Implementation.** We implemented our survey module in the 2017 wave of the SOEP-IS, which consisted of 1,115 individuals (Sample I3). Our study requires that respondents participate in the risk-preference elicitation task. Because respondents could refuse to do so, we included only respondents with non-missing observations, resulting in 914 observations. Importantly, missing observations are not more likely to appear in either of the two treatment conditions (17 percent in the control and 20 percent in the treatment condition, t-test, p=0.20).[11] In Section 4.3, we provide further evidence that there is no differential selection into the risk elicitation task and that our results are robust to re-weighting the study sample to match the socio-economic characteristics of the entire sample.

In addition, we conducted a manipulation check to illustrate through which channel our intervention affects risk-taking. For this purpose, we recruited a new sample (N = 987) through respondi, an internationally well-known panel provider, since we could only implement some basic tests in the SOEP-IS (see Section A.2 for more implementation details). We implemented a short survey (median duration six minutes) with the exact same treatment intervention and measured its impact on the perceived rank in the wealth distribution, median and top-income levels, LoC, self-esteem, and credibility of the wealth data.

**Covariates.** We consider a set of observables that have been shown to relate to risk aversion (see Dohmen et al., 2011). These observables include age, gender, equivalized net income, marital status, household size, employment status, satisfaction with health and life, and region (East/West Germany). We consider education, which is measured by the highest degree or diploma, taking

[11] Respondents could not condition their participation on the lottery stakes because they only received some general explanation of the elicitation task before they had to indicate their participation decision.

into account schooling, vocational training, and university education.[12] In addition, we include the educational background of both parents by using eligibility for attending university (a completed *Abitur*) as a proxy for their educational attainment. We also control for baseline risk using a qualitative measure of general risk aversion measured on a scale from 0 to 10 (very willing to not willing to take risks) before the treatment. Finally, we construct a wealth measure from household information on assets and housing following Fuchs-Schündeln and Schündeln (2005) and consider homeownership, which is the most important component of wealth in Germany below the top 1% of the wealth distribution (Schröder et al., 2020), as a proxy for wealth.

**Balance.** In Table A3, we present p-values from a set of linear regressions assessing the balance of observables by treatment status. The results of these regressions (including an F-test for joint significance of all variables) indicate that the treatment and control groups are very similar along these observables. Nevertheless, we will show all empirical results with and without covariates. Finally, in Table A4, we present the same exercise for LoC and other personality traits. Again, the table indicates that these traits are well-balanced across the treatment and control groups.

## 3 First Stage Results and Manipulation Check

**First Stage.** We start our analysis with a closer look at the "first stage" of our intervention and examine whether it induced a feeling of low relative wealth. As a first step, we show the responses to the wealth categorization in both conditions in Table 1. The treatment manipulation successfully sorted respondents into the different wealth categories, as intended. In the control condition, the distribution of responses in the five wealth categories is well dispersed, and a majority of respondents aligned themselves in one of the three top categories starting from €11,000. In strong contrast, about 80 percent of respondents in the treatment condition placed themselves in the lowest category. Accordingly, the wider wealth intervals of the treatment condition induced most respondents to locate themselves at the lower end of the wealth distribution.

Respondents' categorizations are also reflected in their absolute wealth. For example, the average wealth in the lowest treatment category (ranging to the 80th percentile) is about €127,000, comparable to the average wealth of €126,000 in the four lowest control categories that range up to the 60th percentile. Similarly, the average wealth in the highest control category is close to the

[12] We use this scheme instead of years of schooling because of the early tracking in German schools the same years of schooling do not necessarily mean the same level of educational attainment.

level in the four highest treatment categories (€427,000 vs. €370,000).[13] This alignment of sorting in absolute wealth across conditions in our data implies that respondents do have an accurate assessment of their own absolute level of wealth. Thus, our treatment manipulation is unlikely to affect perceptions of absolute wealth.

The second step is to see whether the treatment successfully induced a feeling of a low relative standing and a larger gap to the top. To minimize concerns about demand effects and anchoring, we deliberately focused on respondents' perceptions about the relative income distribution and placed the question in a subsequent and unrelated survey module.[14] We ask respondents to estimate the household income above which they are richer than 90 percent of other households. Suppose the treatment successfully induced a perception of lower relative standing in the wealth distribution. In that case, we should expect a similar qualitative effect on this relative income estimate, given the positive correlation between wealth and income. That is, inferring the 90th income percentile based on own income should result in higher estimates in the treatment condition, indicating a larger perceived gap to the top. Column (1) of Table 2 confirms this hypothesis and indicates a strong effect: treated respondents estimate that the 90th percentile in the household income distribution is 29 percent higher compared to what untreated respondents think.

**Manipulation Check.** We complement these first-stage results with a separate manipulation check to provide more direct evidence of how our intervention affects behavior. We show that the treatment influences how respondents perceive the overall wealth level (i.e., the median and 90th wealth percentile) and their relative position in the wealth distribution. Columns 2–4 in Table 2 show the results from this exercise. First, the estimates for the net wealth at the median and 90th percentile are higher among treated respondents (columns 2 and 3). However, the effect on the 90th percentile is substantially more pronounced and significant, implying that treated respondents perceive an asymmetric shift in the distribution at the upper end. Second, and most importantly, the treatment has an effect on relative rank perceptions. When asked how their wealth situation compares to other German households, only 22 percent of treated respondents say it is better or much better (compared to 30 percent in the control condition, t-test, $p < 0.01$). In the last column of Table 2, we quantify this assessment and show how respondents compare their net wealth to other

[13] We see a similar pattern if we look at homeownership as a proxy for wealth, which is not surprising given the strong correlation between wealth and homeownership ($\rho = 0.58$).

[14] Both measures should alleviate concerns that the "first stage" merely reflects numerical anchoring effects (or demand effects) because it is assumed that anchoring is a short-lived phenomenon and the treatment targeted relative wealth standing for which the exact quantitative mapping from wealth to income figures is non-trivial.

households: treated respondents think they rank significantly lower in the wealth distribution than non-treated respondents and thus perceive themselves as poorer. These findings further illustrate that the intervention affects relative wealth perceptions but not absolute wealth perceptions.

The manipulation check also allows us to rule out some other channels through which the intervention may influence risk-taking. First, we show that respondents find the presentation of wealth categories credible in both treatment and control groups. We see virtually no difference in the credibility rating of the presented wealth data (see Table A6, column 1). Second, we test whether relative concerns have a bearing on respondents' LoC. We find no evidence for such an effect: treated respondents display a similar level of LoC as respondents in the control group (Table A6, column 2). Finally, we address a concern that the treatment induces a temporary change in emotional states, for example, because one learns that one's wealth is at the lower end of the distribution. We examine the impact of our treatment on two different positive and negative affective states – self-esteem and mood – and on limitations due to emotional problems. We find no indication that the feeling of low relative standing results in changes in these affective states and limitations (Table A6, columns 3–5).

In summary, we take these results as evidence that exposing respondents to wider wealth intervals in the treatment condition generated a very strong "first stage" and had the intended effect of significantly shifting respondents' views about whether their relative standing in the wealth distribution is low or not.

# 4 Main Results

## 4.1 Average Treatment Effect

We now analyze how perceived relative standing in the wealth distribution impacts respondents' willingness to take risks. To investigate this effect, we follow standard practice in the literature and assume that individuals are expected utility maximizers who exhibit constant relative risk aversion (CRRA) (e.g., Binswanger, 1980; Andersen et al., 2008; Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011; Sahm, 2012; Carvalho et al., 2016a).[15] It is common in the literature to assume that individuals do not integrate their background wealth into the payoffs offered in such incentivized choice tasks (Andersen et al., 2008), since otherwise small lottery stakes would imply implausible

[15]Using panel data, Chiappori and Paiella (2011) present empirical evidence that portfolio choices across the distribution of household wealth are well described by constant relative risk aversion (see also Brunnermeier and Nagel, 2008; Sahm, 2012).

levels of risk-aversion (Rabin, 2000). Fudenberg and Levine (2006) provide one way to rationalize this approach through separating short-term consumption budgets from background wealth in a dual-self model, where agents evaluate choices relative to short-term consumption and not wealth. In our context, we might think of relative wealth as informative of short-term relative consumption budgets.[16] Importantly though, our results do not depend on this specific functional form of utility (see Section 4.3).

Under this assumption, we can represent the utility of a monetary amount $x$ as $u(x) = x^{1-\rho} \times (1-\rho)^{-1}$, where $\rho$ is the coefficient of relative risk aversion, with higher values corresponding to greater risk aversion. We calculate lower and upper bounds for the CRRA parameter $\rho$ for each lottery as explained and displayed in Table A1. The parameters range from extreme risk aversion ($\rho > 7.51$) to risk-neutral (loving) ($\rho \leq 0$). We then model the unobserved risk preference parameters as a latent variable that is linear in its covariates:

$$CRRA_i^* = \tau \times Treatment_i + \beta_1 \times BaselineRisk + \mathbf{X_i'}\boldsymbol{\beta}_2 + \epsilon_i, \tag{1}$$

where *Treatment* is an indicator for being induced to think that one's own wealth is at the lower end of the wealth distribution, Baseline Risk is a qualitative risk measure elicited prior to the treatment, and $\mathbf{X}$ includes a constant term and our standard set of socio-demographic variables, as outlined in Section 2.2 (see also Table A3).

Assuming $\epsilon \sim \mathcal{N}(0, \sigma_\epsilon^2)$, we can use the mapping of observed lottery choices into theoretical intervals of CRRA values to estimate the parameters of model (1) by maximum-likelihood. For example, the choice of lottery 3 is consistent with a CRRA parameter on the interval $[0.821, 1.74]$. The likelihood contribution of an individual $i$ choosing lottery 3 is consequently the probability that their CRRA parameter $\rho$ falls within this interval, i.e., $Pr(0.821 \leq CRRA_i^* < 1.74)$. Note that this estimation procedure is tightly linked to an ordered probit model. The difference lies only in the fact that we construct the intervals for the latent variable, $CRRA_i^*$, based on economic theory, whereas in an ordered probit model, we would additionally need to estimate these boundaries. In Section 4.3, we also present evidence that our results do not depend on this specific estimation strategy.

[16] Note that the CRRA utility we use for estimation is defined for absolute rather than relative consumption. However, given the ubiquitous use of CRRA preferences in economics, this type of utility modeling is a convenient way to interpret and compare treatment effects across studies.

**Risk Parameters.** In a first step, we estimate the parameters of model (1), using control group observations only, to look at the correlates of risk preferences with socio-demographic variables (see Table A5). In line with most of the literature, we find that females are more risk averse and that better-educated respondents are less risk averse (e.g., Barsky et al., 1997; Dohmen et al., 2011; Chapman et al., 2018). We also find that married and unemployed respondents are more risk averse, while higher income, having better-educated fathers, and higher health satisfaction are associated with less risk aversion.

Next, we relate our incentivized measure of risk preferences to the qualitative baseline risk measure. Prior research indicates that this qualitative measure correlates strongly with an experimentally elicited risk measure and predicts risk-taking in several life domains (Dohmen et al., 2011). Our control group data affirm this relationship as well. We see a strong correlation between our incentivized risk measure (which differs from the validation instrument in the previous literature) and baseline risk. A one standard deviation increase in the qualitative risk measure is related to a 0.57 higher CRRA parameter $\rho$ (see Table A5, column 3).

**Regression Analysis.** To provide statistical evidence on the effect of perceived relative wealth on risk-taking, we repeat the estimation of (1) for the treatment and control group. Table 3 presents the estimates. Column (1) includes a treatment indicator, baseline risk attitudes, and a constant, whereas column (2) also adjusts for our set of covariates. Following the theoretical reasoning above, the treatment effect is negative, indicating a decrease in risk aversion. Unsurprisingly, given the random assignment, the estimated effect is similar in both cases. The estimates point to a reduction in the measured CRRA parameter of roughly 0.53-0.56. Compared to the control group mean of 2.86, this amounts to a change of about 19 percent. Figure 1 illustrates the result from column (2). It shows a sizeable shift of the predicted CRRA parameter $\rho$ towards lower values in the treatment condition, meaning less risk aversion. In line with the structural estimates from Table 3, we show that respondents in the treatment group have a five percentage points lower propensity to choose the safe lottery, offering a sure payoff of 50€, relative to a mean of 23% in the control group ($p = 0.047$, see Table A9). Together, this is evidence of less risk aversion if respondents perceive to be at the lower end of the wealth distribution.

To put the result into perspective, we compare our estimates to other studies. For example, Carvalho et al. (2016b) estimate that a random assignment to savings accounts for rural Nepalese households leads to a 17 percent increase in risky choices in a similar lottery task. Other studies

estimate gender differences in CRRA parameters of 30 percent (e.g., Garbarino et al., 2011). Given these numbers, the average treatment effect presented above appears sizable. At the same time, we must keep in mind that the average predicted CRRA parameter in both the treatment and control groups is well above two and thus consistent with risk aversion. While the treatment shifts the level considerably, it reduces the aversion to risk and does not lead to risk neutrality or even risk-loving behavior.

### 4.2 Moderating the Effect: Locus of Control

We now turn to our second contribution and identify the respondents who are particularly likely to respond to relative concerns with increased risk-taking. As indicated earlier, psychological research suggests that low self-esteem and a feeling of little control over life outcomes (external LoC) are associated with a higher tendency to engage in social comparisons. Figure 2 illustrates this relationship using data from the SOEP-IS. The figure confirms that the inclination to compare oneself to others increases with more external control beliefs.[17] This higher inclination to comparisons can emerge from a need to improve well-being and self-esteem through favorable social comparisons (Wills, 1981), which is more relevant to people with external control beliefs as their utility gains are presumably larger than that of internal people.[18] In addition, data from the World Value Survey suggest that these people (i.e., those with more external control beliefs) react more strongly to relative comparisons as they substantially reduce risk aversion the more inequality they face (see Section A.1 for details). Therefore, we expect that inducing a feeling of low relative wealth likely triggers a stronger response among external people because more risk-taking is their only way to improve relative standing and well-being.

**Descriptives.** The median LoC score in our sample is 3 (average: 3.13, see Figure A1 for the distribution of LoC). The distribution of LoC indicates that the majority of respondents have internal control beliefs, which confirms previous findings from the SOEP (e.g., Nolte et al., 1997). In Table A5 (columns 5–6) and Figure A2, we present correlates of LoC based on control group data.

[17] We draw here on the Social Comparison Scale that measures an individual's disposition towards making social comparisons. This scale is part of a different and independent SOEP-IS sample ($N = 1,388$), and thus we cannot link the scale directly to our respondents (see notes of Figure 2 for more detail).

[18] Consistent with the idea that favorable relative comparisons boost self-perceptions and that the utility gains of such comparisons are larger for people at the lower end than at the top of the distribution, Figure A3 shows a strong and positive correlation between perceived wealth rank and self-esteem and a negative relationship with income adequacy (i.e., a higher rank translates into less need for money).

Consistent with existing empirical evidence, we document an education and income gradient, i.e., more education and higher income are associated with lower external control beliefs.

**Regression Analysis.** In Table 3, we present regression results on these heterogeneous effects using the following specification for the latent curvature parameter of the CRRA utility:

$$CRRA_i^* = \tau * Treatment_i + \delta * LoC_i + \gamma * Treatment_i \times LoC_i + \mathbf{X_i'}\boldsymbol{\beta} + \epsilon_i. \quad (2)$$

Note that regression specification (2) includes a standardized and continuous measure of control beliefs, $LoC_i$. The main coefficient of interest, $\gamma$, can therefore be interpreted as the additional effect of our treatment for an individual with a one standard deviation higher *LoC* score.

The results are displayed in column (3) of Table 3. There is a positive relationship between LoC and risk-taking, confirming the commonly observed pattern in the literature. That is, respondents with an external LoC exhibit higher risk aversion than respondents with an internal LoC. However, the treatment reverses this relationship: respondents with a higher LoC score, indicating more external beliefs, display a stronger treatment effect, i.e., towards a lower estimated CRRA parameter ($p < 0.001$). Adjusting for basic sociodemographic characteristics has virtually no effect on the coefficient estimate of the interaction term (column 4). Moreover, the result is robust to controlling for the *false discovery rate (FDR)*.[19] Figure A4 illustrates the results graphically. The figure splits the sample by the median of LoC (3) and shows the effect is concentrated in respondents with an above-median LoC. The estimates suggest that the average treatment effect is entirely driven by respondents with more external control beliefs.

The magnitude of the effect is sizable: a one standard deviation shift towards more external beliefs leads to a difference in the corresponding treatment effect that is almost twice the size of the average treatment effect (Table 3, column 1). Put differently, for an individual with a 0.5 standard deviation higher LOC score, the treatment shifts the CRRA parameter downwards by almost 1. In terms of model calibration, this is equal to a difference between a relative risk aversion parameter $\rho = 2$ and log-utility.

The moderating role of LoC in shaping responses to relative concerns is consistent with the idea that a person's individual-specific belief system can act as a (perceived) constraint on the

[19] In Section 4.3, we test the robustness of the moderating effect of LoC using an array of alternative factors that may drive the relationship. Therefore, we address potential concerns about multiple-hypothesis testing using the two-stage linear step-up procedure by Benjamini et al. (2006) that controls for the *false discovery rate* (see Appendix Section A.3).

set of strategies available to improve relative standing (Borghans et al., 2008). For example, the appeal of gambling and other risky low-expected return strategies for moving up the social ladder depends to a reasonable extent on the availability of alternatives, such as investments in human capital or increased effort on the job. However, an external belief system may render these options less attractive as they rely more on one's efforts and abilities. Thus, heterogeneity in these beliefs determines the set of constraints and, thus, the response to a variation in relative standing.

### 4.3 Robustness

Next, we describe a battery of exercises to probe the robustness of our results. These exercises address concerns about internal validity and include alternative specifications of the outcome and LoC. Moreover, we provide evidence that other personality traits are unlikely to moderate the effect on risk-taking and on the external validity of the results.

**Non-Compliance.** Recall that participation in the risk-elicitation task was voluntary. Consequently, a potentially worrisome threat to internal validity is differential selection into the risk-preference elicitation task. We address this issue in several ways. First, we note that the sample is balanced on a set of important observables, including baseline risk aversion (see Table A3). Therefore, it is unlikely that the main effects are driven by differential selection with respect to pre-treatment risk aversion. Second, in Table A7, we provide further evidence that non-participation in the risk-elicitation task is orthogonal to the randomly assigned treatment status. In particular, we show that non-participation in the risk-elicitation task does not differ across conditions (panel a.) and that baseline risk aversion is the same across respondents and non-respondents (panel b.) and treatment and control (panel c.). Third, we show that our results are robust to re-weighting the study sample to match the socio-economic characteristics of the full sample. That is, we use a probit regression to predict the sampling probability of each respondent with a set of observable characteristics and use the inverse of this probability to construct individual weights. Table A8 reveals that this re-weighting exercise yields very similar results as our unweighted estimates. Taken together, there is little reason to worry that the decision to participate in the lottery task biases our estimates.

**Alternative Outcome Measures.** Following the literature, we impose a specific functional form – constant relative risk aversion – on respondents' risk preferences. We provide two exercises to

show that our results depend neither on the functional form nor the resulting estimation strategy. First, we can construct a binary risk measure for choosing the safe lottery, which does not impose any functional form. As indicated in Section 4.1, treated respondents display a lower likelihood of choosing the safe lottery than non-treated respondents (see Table A9). Table A9 also shows that only respondents with an above-median LoC (external control beliefs) react to the treatment. Second, we use the midpoint of the CRRA intervals and estimate a linear regression model. While this alternative approach is less demanding in terms of distributional assumptions than an interval regression, it does not account for censoring and does not reflect uncertainty about the exact value in the interval. We present results from such regressions in Table A10. Qualitatively our conclusions do not change. Individuals with external control beliefs predominantly react to our treatment manipulation.

**Alternative LoC Scores.** As is common in the literature, we use a single index for LoC in our analysis. However, a concern is that this index is based on unweighted averages (Cobb-Clark and Schurer, 2013). An alternative is to perform a principal component analysis to extract a separate score for internal and external control beliefs (see e.g., Pinger et al., 2018). In Table A11, we interact each of the two scores with our treatment indicator. The findings corroborate our previous conclusions and show that the choice of how to represent individual LoC beliefs does not affect our conclusions in a meaningful way.

**Other Personality Traits.** A widespread concern is that LoC merely captures the effects of other facets of personality, such as the Big 5, optimism, or self-control. For instance, Judge et al. (2002) consider the LoC as part of a higher-level construct that is intermeshed with other traits such as neuroticism. Similarly, evidence suggests that optimism is related to LoC (see Table A5) and risk aversion (Dohmen et al., 2018). We explore these concerns along two margins. First, we re-estimate regression (2) and additionally adjust for the Big 5 (obtained from a previous wave), our optimism proxy, and a self-control score (Table A12, columns 3-5).[20] While this reduces the magnitude of the statistical association between LoC and our risk measure, it does not affect the coefficient

[20]The optimism proxy we use here is based on the following question that we administered before the LoC questions: *"If you think about the future: Are you... (1) optimistic; (2) rather optimistic than pessimistic; (3) rather pessimistic than optimistic; (4) pessimistic?"*. The conclusions do not change if we instead use a measure for optimism relative to one's peer group. Note that Dohmen et al. (2018) use a different optimism measure based on self-reported degrees of optimism and pessimism. The self-control score is based on a 13-item module following Tangney et al. (2004) that was administered by an independent study on the same sample (Cobb-Clark et al., 2019). We recode each item such that higher values are indicative of a stronger sense of self-control. Subsequently, we standardized their sum using the sample mean and standard deviation.

estimate of interest: the interaction between LoC and the treatment. This is also true if we condition on all other personality traits at the same time (Table A12, column 6). Second, in Table A13 we additionally show that none of the alternative traits are stand-ins for LoC by fitting models that interact our treatment with each component of the Big 5, optimism, and self-control separately. In contrast to LoC, none of the interactions between these other personality traits are statistically distinguishable from zero, which is reassuring evidence that the treatment effect we observe is moderated by LoC and not by other personality traits.

**Emotions.** There is some evidence that risk preferences and LoC are tightly linked to emotions (e.g., Loewenstein et al., 2001; Cohn et al., 2015; Meier, 2022). To investigate the potential role of emotions in moderating the treatment effect, we follow the same approach as in our analysis of personality traits above. In Table A14, we re-estimate regression (2) and control for anger, fear, and a combined measure of happiness and sadness.[21] Again, we basically see that our main result is robust to controlling emotions. Next, we interact each of these emotions with our treatment and report the results in Table A15. We find no indication of heterogeneity in our results that are related to emotions. This is further evidence that emotions have no measurable effect in our context: neither as moderators nor as an alternative channel of the treatment (see the results from the manipulation check).

**Other Socio-Economic Characteristics.** To explore whether the heterogeneous effects of LoC just pick up heterogeneity in some socio-economic characteristics, we rerun our specification (2) with socio-economic characteristics that are associated with LoC, such as unemployment status, income, and education. Differentiating respondents along these categories also reveals substantial differences in their tolerance of risk. This is, for example, true for gender: women are more risk averse than men.[22] However, we find no evidence that any of these socio-economic characteristics interact with the treatment, suggesting that LoC affects heterogeneity independent of these characteristics (Table A16).

[21] The SOEP-IS routinely asks how often respondents experienced anger, fear, happiness, and sadness in the four weeks prior to the interview. Following the literature, we combine happiness and sadness in an index by taking the average of their difference and adjusting the index to be in the same range as the other emotions (see Meier, 2022).

[22] The sample gender difference in the implicit CRRA parameter is roughly 33%, and the unemployed/employed contrast is 29%. Both magnitudes lie well above the difference observed for LoC.

# 5 Conclusion

We have presented evidence for the causal link between relative concerns and risk-taking. This behavior is particularly pronounced among people who are leaning towards a more external locus of control, i.e., people who tend to believe that life outcomes are the result of luck and fate. Our result challenges recent theoretical models predicting risk-taking in the middle of the distribution in response to relative concerns (e.g., Becker et al., 2005; Ray and Robson, 2012). In fact, our evidence points to more risk-taking if relative standing is perceived as low, which is consistent with papers showing that gains from improving relative standing are stepper at the bottom of the distribution (Kuziemko et al., 2014; Hopkins, 2018). The result also provides a novel perspective on the attractiveness of risk-taking as standard accounts of risk attitudes usually do not account for heterogeneous responses of individual-specific beliefs to relative concerns.

Taken at face value, our results highlight that the phenomenon could be widespread across the entire wealth distribution as long as one's *perceived* standing is low. Of course, the nature of risk-taking may vary along the distribution. As Becker et al. (2005) point out, unproductive risk-taking is more frequent among less well-endowed individuals, while risk-taking in the form of entrepreneurship is typically only feasible at higher wealth levels. The former often corresponds to risk-seeking behavior, for example, gambling and other risky activities with low average returns, while the latter can be seen as a more productive risk. Therefore, as long as the higher propensity to take risks is reflected in efficient ways of gambling, such as entrepreneurial activities, educational investments, and occupational choices, we may see positive welfare effects.

Similar to most other empirical case studies, our study is not without limitations. To elicit risk preferences in an incentivized way, we necessarily had to rely on lottery choices involving moderate stakes. A natural question is thus how our results carry over to settings with higher stakes. Relatedly, our focus is restricted to possible improvements in relative standing because it was not possible to elicit risky choices in the negative outcome domain. Negative outcomes are, however, common, and a real-world application that addresses issues around negative outcomes and merits further study is insurance choices. While we are not able to observe these choices, our results help us to predict behavioral responses to relative concerns across domains. If the effect of relative comparisons on risk-taking is sufficiently symmetric around gains and losses, our results indicate that individuals might be less inclined to spend money on insurance if they are concerned about their low relative standing.

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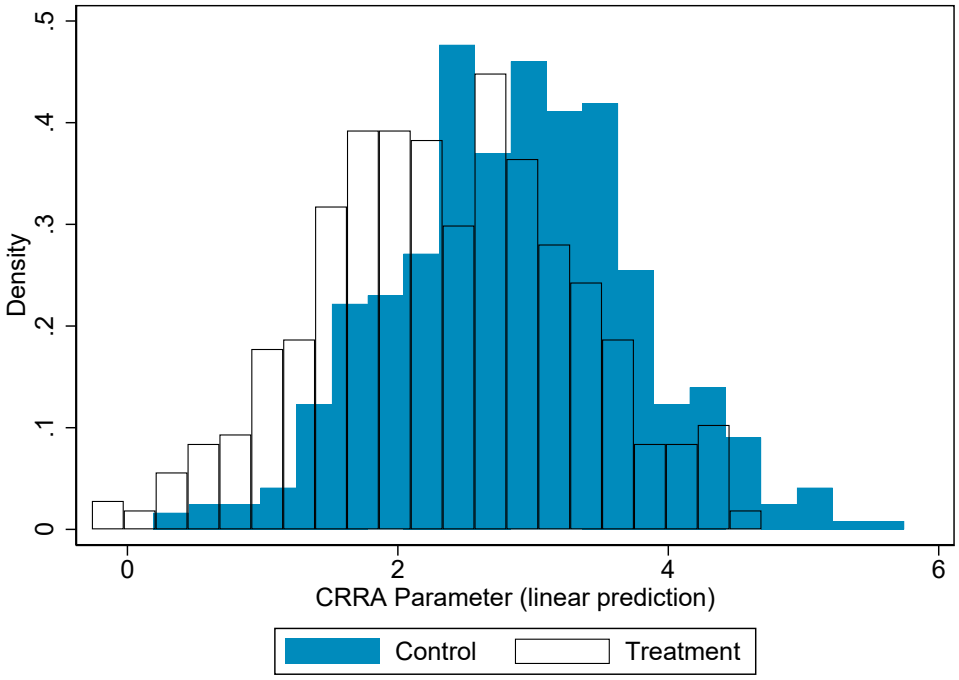
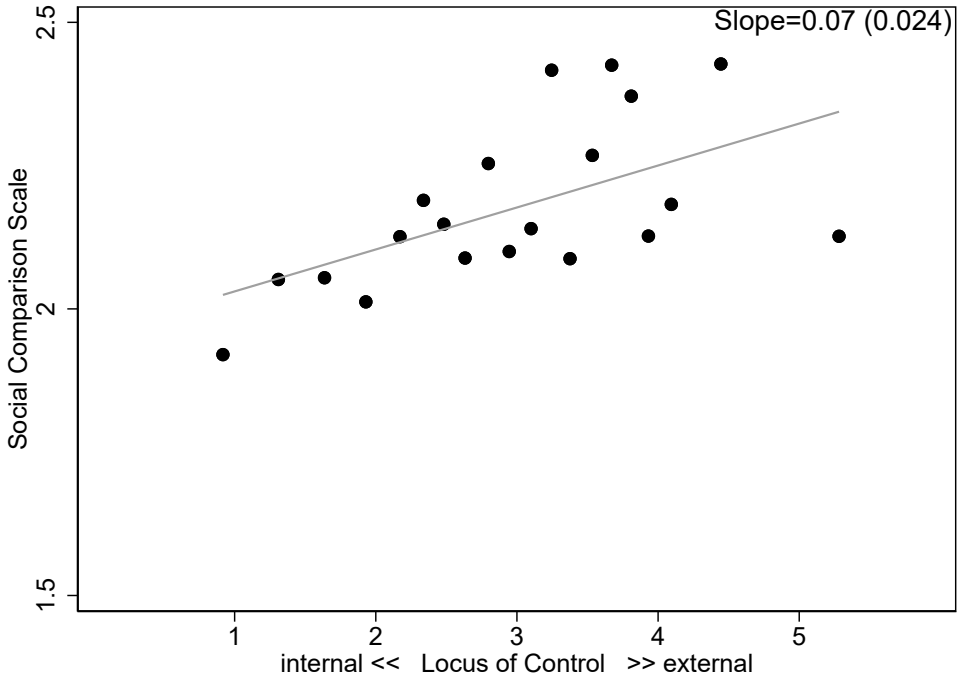
# Figures

Figure 1: Distribution of Predicted CRRA Parameters by Treatment




Notes: Predicted CRRA parameters from interval regression regressing the CRRA parameter $\rho$ on a treatment indicator and a set of standard covariates: age, gender, education, parents' education, equivalized net income, marital status, the number of household members, employment status (self-employed, unemployed, retired), baseline risk aversion, homeownership, satisfaction with health, and region. Lower values of $\rho$ indicate higher tolerance for risk. Data: SOEP-IS Sample I3.

Figure 2: Locus of Control and Relative Comparisons




Notes: Binned scatterplots of LoC and relative comparisons using data from a different representative SOEP-IS sample ($N = 1,388$). LoC is proxied by the belief that *life is mostly controlled by fate* and the belief that *working hard enough likely results in a good life*; we constructed an equally weighted index of these two beliefs with higher values indicating more external beliefs. Relative comparisons are measured with a short version of the Social Comparison Scale (Schneider and Schupp, 2011), which is an equally weighted index of three statements about a person's tendency to engage in social comparisons with higher values indicating higher dispositions towards social comparison. The statements are *I often compare myself with others with respect to what I have accomplished in life*, *I often compare my social skills and popularity with those of other people*, and *I always pay very strong attention to how I do things compared to others*. All measured on a scale from 1 (disagree strongly) to 5 (agree strongly). Control variables include age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), baseline risk aversion, homeownership, satisfaction with health, life satisfaction, and region (East/West Germany). Data: SOEP-IS Sample I2/I4.

# Tables

Table 1: Wealth Categories by Treatment

| **Control Group** | | **Treatment Group** | |
|---|---|---|---|
| *Wealth Category (in €)* | *% responses* | *Wealth Category (in €)* | *% responses* |
| <2,500 | 27.05 | <275,000 | 79.01 |
| 2,501 – 11,000 | 20.00 | 275,001 – 468,000 | 12.74 |
| 11,001 – 27,000 | 11.59 | 468,001 – 722,000 | 5.19 |
| 27,001 – 112,000 | 16.82 | 722,001 – 989,000 | 1.65 |
| >112,000 | 24.55 | >989,000 | 1.42 |

Notes: Wealth categories used in the two conditions and share of observed responses in each category. Upper bounds taken from 2014 Household Finance and Consumption Survey (HFCS, Deutsche Bundesbank, 2016). Data: SOEP-IS Sample I3.

Table 2: First-Stage Effects of Treatment and Manipulation Check

| | First Stage | Manipulation Check | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Income Top 10% | Median net wealth | Wealth Top 10% | Rel. Wealth |
| Treated | 0.293** | 0.240 | 0.483** | -0.172*** |
| | (0.139) | (0.148) | (0.231) | (0.062) |
| Sample | SOEP-IS | respondi | respondi | respondi |
| Observations | 865 | 987 | 987 | 987 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
GLM regressions (gamma-log; columns 1–3) and OLS regression (column 4) with standard errors in parentheses. First stage based on SOEP-IS Data and manipulation check based on respondi sample (see Section A.2). The first-stage dependent variable ("Income Top 10%") is the estimated threshold for being in the top 10% of the pre-tax household income distribution in Germany ("In your estimation, what gross annual income do you need to be in the top 10 percent of German households?"). "Median net wealth" is the estimate of the median of the wealth distribution ("What do you think is the net wealth of the household in the middle of the ladder?"); "Wealth Top 10%" is the estimated net wealth at the 90th percentile ("What do you think is the required net wealth to belong to the 10% richest households (i.e. to be on the top rung of the ladder)?"); "Rel. wealth" is a respondent's perceived rank in the wealth distribution ("What do you think is the share of households in Germany that have less net wealth than your household?"), which is standardized to zero mean and unit variance. Covariates include age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), homeownership, and region (East/West Germany). Data: SOEP-IS Sample I3 and respondi.

Table 3: Main Treatment Effects

| | CRRA Parameter | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Treated | -0.531*† | -0.561**† | -0.535*† | -0.551**† |
| | (0.282) | (0.279) | (0.281) | (0.277) |
| Treated x LoC | | | -0.953***/# | -0.952***/# |
| | | | (0.283) | (0.278) |
| LoC | | | 0.566*** | 0.385* |
| | | | (0.208) | (0.213) |
| Baseline Risk | 0.357** | 0.313** | 0.374*** | 0.342** |
| | (0.141) | (0.142) | (0.142) | (0.141) |
| Constant | 2.865*** | 3.496*** | 2.885*** | 3.747*** |
| | (0.199) | (1.068) | (0.198) | (1.083) |
| Covariates | No | Yes | No | Yes |
| Observations | 914 | 914 | 914 | 914 |
| Log-Likelihood | -2074.25 | -2055.64 | -2068.51 | -2049.49 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; † $p < 0.05$, p-value from randomization inference (5000 replications); # indicates significance when using the two-stage linear step-up procedure by Benjamini et al. (2006) that controls for the *false discovery rate (FDR)*.

Interval regressions with standard errors in parentheses. The dependent variable is the CRRA parameter $\rho$ (with lower values indicating higher tolerance for risk). *LoC* is the z-score of a single index for locus of control, constructed as detailed in Table A2. Higher values correspond to more external beliefs. Covariates include age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), homeownership, satisfaction with health, life satisfaction, and region (East/West Germany). Data: SOEP-IS Sample I3.

# Appendix – For Online Publication Only

# Status, Control Beliefs, and Risk-Taking

Dietmar Fehr and Yannick Reichlin

## A.1 Income Inequality, Risk-Taking, and Control Beliefs

In this section, we document the relationship between income inequality and risk-taking and that this relationship is moderated by an external locus of control. Inequality is tightly linked to the relative position in the wealth (and income) distribution. The distribution of wealth affects how much richer others are, and this notion of relative deprivation translates into the Gini coefficient at the aggregate level (Yitzhaki, 1979; Hey and Lambert, 1980). The reported findings are based on the analysis of data from two large-scale international surveys: the Global Preference Survey (Falk et al., 2018) and the World Value Survey (Inglehart et al., 2014).

**Global Preference Survey (GPS).** The GPS contains a validated risk measure, elicited in nationally representative samples of 76 countries spanning some 90% of the world's population. The risk measure is a weighted average of a qualitative self-assessment of risk tolerance akin to the qualitative measure in the SOEP (see section 4.3) and a quantitative measure of a sequence of lottery choices. We focus here on the aggregated level and compare national-level summary statistics of the risk measure with a national-level measure of inequality, the Gini index, taken from the World Bank's World Development Indicators (WDI). The two measures are significantly correlated (p=0.005) with a Pearson correlation coefficient of 0.33, suggesting that in more unequal countries, the population is, on average, more risk-tolerant. Pickard et al. (2023), in work initiated after our initial working paper, provide a more detailed account of inequality and risk-taking using the GPS. We next turn to an individual-level analysis that allows us to consider the moderating effect of LoC.

**World Value Survey (WVS).** The WVS collects socio-demographic information, political attitudes, and value judgments from nationally representative samples in repeated cross-sections. Wave 5 (2005-2009) and Wave 6 (2010-2014) contain two questions that are particularly relevant to our

purposes. First, the waves include a measure of risk attitudes developed by Schwartz (1992), which asks respondents to compare themselves to a hypothetical person who finds it important to "experience adventure and [take] risks." Answers range on a scale from (1) *very much like me* to (6) *not at all like me*. The measure captures sensation-seeking as developed by personality psychologists and is conceptually related to economists' notion of risk-aversion (Almlund et al., 2011). Second, they include a proxy for locus of control. Respondents are asked about their view of whether they can decide their own destiny or whether it is impossible to escape a predetermined fate on a scale from (1) *everything is determined by fate* to (10) *people shape their fate themselves*. To ease interpretation, we standardize answers to both questions by their sample mean and standard deviation and recode the LoC question such that higher values imply more external beliefs.

In our analysis, we use Wave 5 and 6 of the WVS and merge this data with information on national-level inequality from the WDI. This leaves us with a sample of 145,206 individual observations, coming from 71 countries and spanning 12 years. We estimate linear regressions of measured risk attitudes on a proxy for inequality, locus of control beliefs, and their interaction. Table A17 shows that individual risk aversion is negatively correlated with national-level inequality. This complements the aggregate-level correlation we have seen in the GPS that is based on a validated risk measure. Moreover, we see that this relationship is considerably more pronounced for individuals with external control beliefs and robust to including a battery of observable socio-demographic variables, survey year fixed effects, and dummies for cultural country clusters.

This result from the WVS indicates that individuals are less risk-averse in countries with greater income inequality and that there is substantial heterogeneity in these preferences along with individual-specific beliefs. Based on this observation, our paper has focused on how perceived low standing in the wealth distribution influences risk-taking and how this response is shaped by locus of control. It also suggests that our evidence has broader significance as it possibly extends beyond the German context.

## A.2 Manipulation Check

**Setup.** After the main study, we conducted a separate survey experiment to illustrate through which channel our intervention affects risk-taking. In the initial survey, we only implemented a basic test of how the intervention affects relative standing because we had to economize on the limited survey time and wanted to minimize demand and anchoring effects. Therefore, the goal

of this second survey was to directly measure the impact of the intervention on (i) respondents' perceived relative position in the wealth distribution and (ii) the perceived wealth level. For this purpose, we recruited a new sample ($N = 987$) through *respondi*, an internationally well-known panel provider, since we no longer had access to the SOEP-IS. We implemented a short survey (median duration six minutes), in which we randomized respondents into treatment and control conditions using the same intervention as in the initial survey. That is, we either presented five wealth categories with wide intervals (treatment) or small intervals (control), and respondents had to indicate into which category their net wealth falls. Note that we updated the upper bounds of the intervals according to the latest available wealth data for Germany (see Table A18).

We are mainly interested in two potential channels through which the intervention may affect risk-taking. First, we test the relative standing channel through a qualitative and a quantitative question. Specifically, we ask how respondents perceive their wealth situation relative to other households and how they perceive their relative rank in the German wealth distribution.

1. Compared to most other households in Germany, would you say that your wealth situation is ...? *[much worse, worse, the same, better, much better]*

2. What do you think is the share of households in Germany that have less net wealth than your household?

   *0 percent (%) means that all households have more net wealth than your household and 100 percent (%) means that no household has more net wealth.*

Second, we test to what extent the intervention affects how respondents perceive the wealth distribution. We address this issue by eliciting the perceived net wealth at the 50th and 90th percentile of the net wealth distribution. To familiarize respondents with this rather involved task, we first explain the meaning of wealth distribution, how one can partition the distribution into ten equally-sized bins, and what the median and 90th percentile is. To ease understanding, we illustrate this graphically with the help of a ladder with nine rungs that indicates the bottom 10% households, the median household, and the top 10% households. Subsequently, respondents estimate the net wealth of the median household and the top 10% household using a slider displaying values according to the function $Y = 500 * exp^{(0.045 * steps)}$, where steps correspond to the slider range from 0 to 200. The specific questions are:

> Now suppose we rank all households in Germany from lowest to highest net wealth and divide this ranking into 10 equal sections as shown on the ladder. On the ladder, the 10%

poorest households would then be on the bottom rung and the 10% richest households on the top rung. The household in the middle divides the ranking into two halves, i.e. 50% of the households are richer, and 50% are poorer than the household in the middle.

3. What do you think is the net wealth of the household in the middle of the ladder?

4. You just estimated that the household in the middle of the ladder has a net wealth of *[estimated median]*€.

   What do you think is the required net wealth to belong to the 10% richest households (i.e. to be on the top rung of the ladder)?

The survey concludes with a few questions on socio-economic characteristics and attitudes, including locus of control (LoC), self-esteem, and income adequacy.

**Results.** We discuss the results from this manipulation check in detail in Section 3 and briefly summarize them here. First, the treatment effect on the 90th income percentile carries over to perceptions about the wealth level. In columns 2–3 of Table 2, we show that treated respondents estimate a higher median and 90th percentile of the German household wealth distribution than non-treated respondents. However, the effect on the 90th percentile is significantly more pronounced, which illustrates an asymmetric shift of the perceived distribution with a larger perceived gap to the very top among treated respondents. In Appendix A.1 below, we elaborate further on the link between inequality, relative comparisons, and risk-taking.

Second, we show that treated respondents rank themselves significantly lower in the wealth distribution than non-treated respondents (Table 2, column 4). We observe a similar pattern for our qualitative measure of relative wealth (Question 1). Only about 22 percent say their wealth situation is better or much better than that of other German households compared to 30 percent in the control condition (t-test, $p < 0.01$). Therefore, the manipulation check further illustrates that the intervention affects relative wealth perceptions but not absolute wealth perceptions.

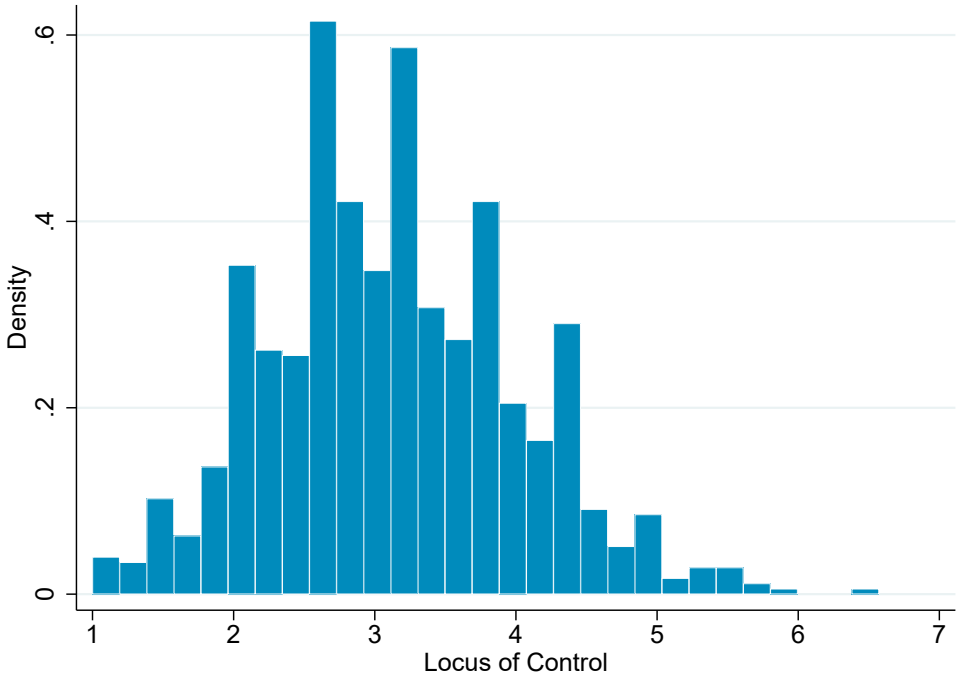
Finally, in Table A6, we show that (i) respondents find the presentation of wealth categories equally credible in both conditions, (ii) relative concerns do not affect LoC, and (iii) the treatment does not affect emotional states.

## A.3 Multiple Hypothesis Test Corrections

In Table 3, we show that respondents with more external beliefs react more strongly to our treatment. To test the robustness of this result, we examine a host of other personality traits (Table A13), emotions (Table A15), and socio-economic factors (Table A16) that may potentially interact with the treatment in some meaningful way. In total, we test 15 variations of regression specification (2). Thus, we control for multiple hypotheses testing using the false discovery rate (FDR), which is the expected proportion of falsely rejected null hypotheses among all rejected null hypotheses. Following Benjamini et al. (2006), we apply the two-stage linear step-up procedure to control for the FDR. Among the 15 hypotheses, only our main result on LoC is significant at a conventional level ($p < 0.001$, Table 3, column 4). This p-value is smaller than the threshold $q^* = 0.0031$ derived from the two-stage linear step-up procedure, the threshold of the Holm correction $\tilde{p} = 0.0033$, and the Bonferroni correction $\tilde{p} = 0.0033$. Accordingly, we can reject the null hypothesis for the interaction of LoC and treatment at conventional and adjusted p-values.

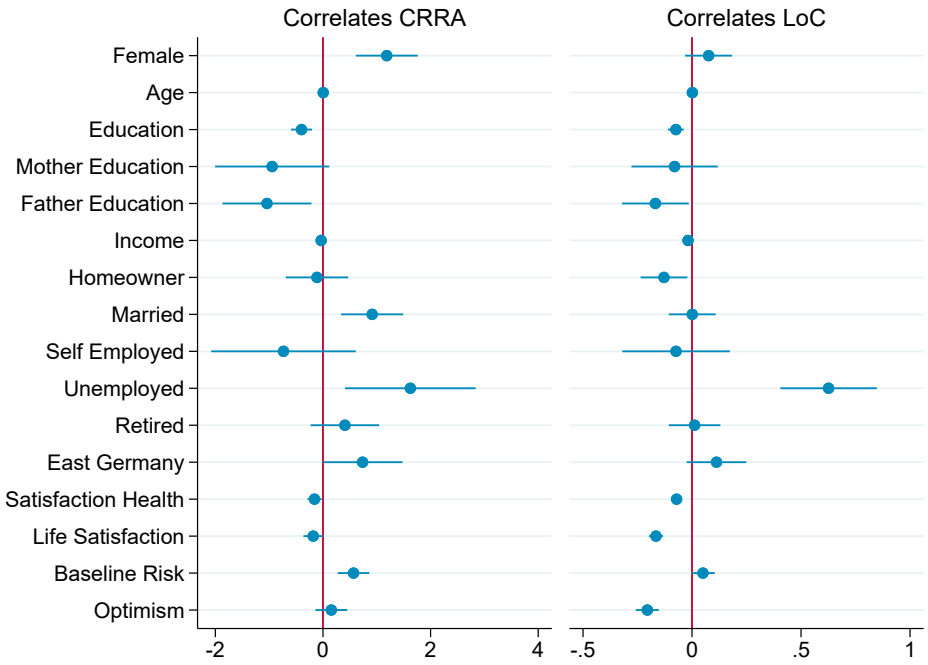
## A.4 Additional Figures

Figure A1: Distribution of Locus of Control




Notes: Histogram of Locus of Control based on the unweighted average of seven Locus of Control items (for more details on the constructed index, see Table A2). Higher values imply more external control beliefs. Data: SOEP-IS Sample I3.

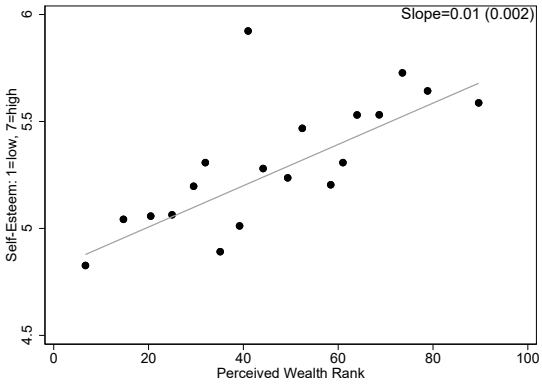
Figure A2: Correlates of Risk and Locus of Control



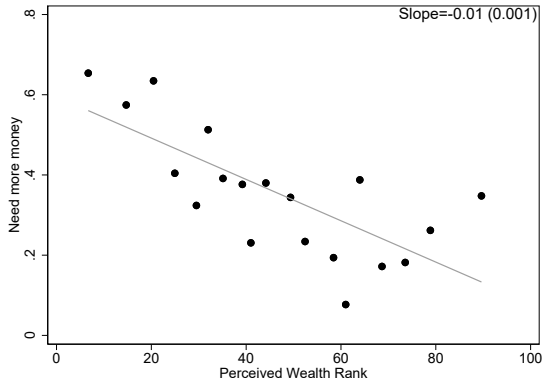

Notes: Coefficient plots from separate OLS regressions of the form $Y_i = \beta_0 + \beta_1 * Covariate + \epsilon_i$, where $Y_i$ is either the CRRA parameter $\rho$ (with higher values indicating less tolerance for risk) or Locus of Control (with higher values indicating more external control beliefs; see Table A2 for more details on the construction of the index). *Education* is measured in 7 categories according to the International Standard Classification of Education (ISCED), with higher categories representing a higher level of education. *Mother (Father) has Abitur* indicates a parent with qualification for university admission (Abitur is the final exam at the end of high school). *Income* is the equivalence scale determined by the square root scale (i.e., we divide the monthly household net income by the square root of the number of household members). *East Germany* is an indicator for respondents who live in East Germany. *Homeowner* identifies respondents who own their house or apartment. *Female, Married, Self-employed, Unemployed, and Retired* are indicator variables. *Satisfaction with health* is measured one a scale from 0 (completely dissatisfied) to 10 (completely satisfied). *Life Satisfaction* is measured one a scale from 0 (completely dissatisfied) to 10 (completely satisfied). *Baseline Risk* is a qualitative risk measure on a scale from 0 (very willing to take risks) to 10 (not at all willing to take risks), standardized using the sample mean and standard deviation. *Optimism* is measured on a scale from 1 (optimistic) to 4 (pessimistic) and recoded such that higher values reflect more optimism. Data: SOEP-IS Sample I3.

Figure A3: Perceived Relative Wealth Rank and Self Perceptions

(a) Self-esteem

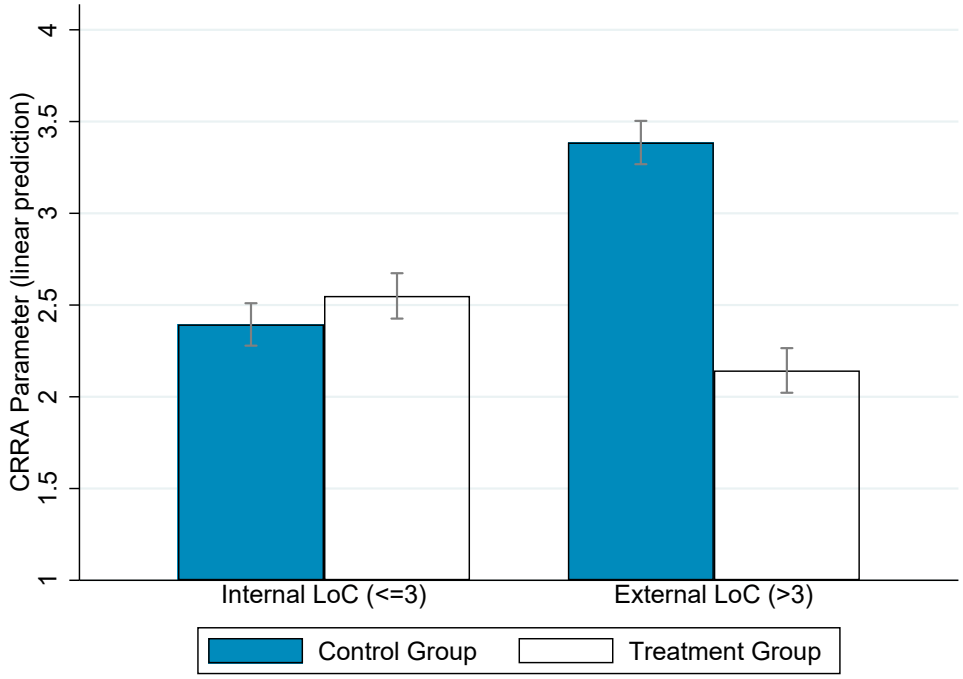



(b) Income adequacy




Notes: Binned scatterplot of perceived relative wealth rank and self perceptions using data from the manipulation check ($N = 987$). Panel (a) displays the relationship between perceived relative rank and self-esteem measured by agreement with statement *"I have a positive attitude towards myself"* on a scale from 1 (disagree) to 7 (agree). Panel (b) displays the relationship with income adequacy (*"Need more money to be able to live a satisfying life – yes/no"*). Data: respondi

Figure A4: Treatment Effect - Locus of Control (Median Split)




Notes: Predicted CRRA parameters from interval regression regressing the CRRA parameter $\rho$ on a treatment indicator and a set of standard covariates: age, gender, education, parents' education, equivalized net income, marital status, the number of household members, employment status (self-employed, unemployed, retired), baseline risk aversion, homeownership, satisfaction with health, and region. The sample in treatment and control is split by the median (=3) of LoC, indicating that the sample is leaning towards more internal control beliefs. Lower values of $\rho$ indicate higher tolerance for risk. Data: SOEP-IS Sample I3.

## A.5 Additional Tables

Table A1: Overview of Gambles

| | Payoffs | EV | S.D. | CRRA-Interval |
|---|---|---|---|---|
| *Lottery 1* | (50, 50) | 50 | 0 | $[7.51, \infty)$ |
| *Lottery 2* | (45, 95) | 70 | 25 | $[1.74, 7.51]$ |
| *Lottery 3* | (40, 120) | 80 | 40 | $[0.812, 1.74]$ |
| *Lottery 4* | (30, 150) | 90 | 60 | $[0.315, 0.812]$ |
| *Lottery 5* | (10, 190) | 100 | 90 | $[0, 0.315]$ |
| *Lottery 6* | (0, 200) | 100 | 100 | $(-\infty, 0]$ |

Notes: Lotteries used in the risk elicition task. Each lottery pays a low or high payoffs (in €) with equal probability. Respondents choose one of the lotteries and for every tenth respondent the chosen lottery was realized and paid out. Assuming CRRA utility of the form $u(x) = \frac{x^{1-\rho}}{1-\rho}$, where $x$ is the respective payoff and $\rho$ the coefficient of interest, we can calculate lower and upper bounds for relative risk aversion for each lottery. For example, comparing the expected utility of Lottery 2 and lottery 3 gives the lower bound of $\rho$ for lottery 2 and the upper bound of $\rho$ for lottery 3.

Table A2: Locus of Control Questions

| **Locus of Control Module Items** | | | | | |
|---|---|---|---|---|---|
| | N | Mean | S.D. | Min | Max |
| *IT 1: The course of my life is depending on me.* | 914 | 5.644 | 1.308 | 1 | 7 |
| *IT 2: In comparison to others, I have not achieved what I deserve.* | 914 | 3.111 | 1.700 | 1 | 7 |
| *IT 3: What you achieve in life, is first of all a question of fate or luck.* | 914 | 3.491 | 1.610 | 1 | 7 |
| *IT 4: I often experience that others are deciding about my life.* | 914 | 2.696 | 1.585 | 1 | 7 |
| *IT 5: You have to work hard to be successful.* | 914 | 5.910 | 1.118 | 1 | 7 |
| *IT 6: When I face difficulties in life, I often doubt my abilities.* | 914 | 3.170 | 1.615 | 1 | 7 |
| *IT 7: Which opportunities I have in life is determined by social conditions.* | 914 | 4.452 | 1.524 | 1 | 7 |
| *IT 8: More important than all effort, are the abilities you have.* | 914 | 4.828 | 1.354 | 1 | 7 |
| *IT 9: I have little control over the things happening in my life.* | 914 | 2.655 | 1.434 | 1 | 7 |
| *IT 10: Social or political involvement can influence social conditions.* | 914 | 3.958 | 1.652 | 1 | 7 |
| **Locus of Control Index** | | | | | |
| *LoC = (-(IT1-8)+IT2+IT3+IT4+IT6+IT7+IT9)/7* | 914 | 3.133 | 0.872 | 1 | 6.571 |
| *External Scale (IT3, IT4, IT6, IT7, IT9)* | 914 | 3.104 | 0.998 | 1 | 6.592 |
| *Internal Scale (IT1, IT5)* | 914 | 2.223 | 0.935 | 1 | 5.500 |

Notes: Descriptive statistics for each item in the Locus of Control (LoC) module. Each item required respondents to answer on a scale from 1 (disagree completely) to 7 (Agree completely). We follow Specht et al. (2013) and the SOEP scales manual Richter et al. (2013) and combine *IT 1, IT 2, IT 3, IT 4, IT 6, IT 7, IT 9* in an equally weighted *LoC* index as in Cobb-Clark and Schurer (2013). As a robustness check, we consider two separate indices for the items corresponding to internal and external control beliefs, respectively Caliendo et al. (2015); Pinger et al. (2018); Caliendo et al. (2022). The items are weighted according to a principal component analysis. For the regression analyses we use standardized versions of all indices with a mean of zero and standard deviation of one. The non-standardized figures here are for illustrative purposes. Data: SOEP-IS Sample I3.

Table A3: Balance

| | Mean Treatment | Mean Control | p-value |
|---|---|---|---|
| Female=1 | 0.54 | 0.53 | 0.906 |
| Age | 48.27 | 46.63 | 0.170 |
| Lower secondary=1 | 0.15 | 0.14 | 0.915 |
| Upper secondary=1 | 0.63 | 0.64 | 0.743 |
| College=1 | 0.23 | 0.22 | 0.772 |
| Mother has Abitur=1 | 0.08 | 0.11 | 0.126 |
| Father has Abitur=1 | 0.14 | 0.17 | 0.319 |
| Income (net/month) | 2075.35 | 2203.91 | 0.076 |
| Home owner=1 | 0.49 | 0.48 | 0.736 |
| Log(wealth) | 10.49 | 10.10 | 0.492 |
| Married=1 | 0.53 | 0.54 | 0.633 |
| No. of HH Members | 2.35 | 2.44 | 0.218 |
| Self employed=1 | 0.05 | 0.04 | 0.557 |
| Unemployed=1 | 0.06 | 0.05 | 0.327 |
| Retired=1 | 0.29 | 0.26 | 0.199 |
| East Germany=1 | 0.19 | 0.17 | 0.303 |
| Satisfaction with Health | 6.79 | 6.62 | 0.273 |
| Life Satisfaction | 7.61 | 7.62 | 0.922 |
| Baseline Risk | 5.04 | 5.11 | 0.643 |
| $Prob > F$ | | | 0.59 |

Notes: $^{*}$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.
Each row presents the means of *covariate* in the treatment and control group along with the p-values from separate OLS regressions of the form $Treated = \beta_0 + \beta_1 * Covariate + \epsilon_i$. $Prob > F$ is the p-value from an F-test for joint significance of all covariates. Education is measured in 7 categories according to the International Standard Classification of Education (ISCED), where *Lower secondary* corresponds to the first two categories, *Upper secondary* to categories 3, 4, and 5, and *College* to the highest category (6). *Mother (Father) has Abitur* indicates a parent with qualification for university admission (Abitur is the final exam at the end of high school). *Income* is the equivalence scale determined by the square root scale (i.e., we divide the monthly household net income by the square root of the number of household members), *Homeowner* identifies respondents who own their house or apartment, and *Log(wealth)* is the log of the estimated wealth level of the household. *Female, Married, Self-employed, Unemployed, and Retired* are indicator variables. *East Germany* is an indicator for respondents who lived in East Germany before 1990. *Satisfaction with health* is measured on a scale from 0 (completely dissatisfied) to 10 (completely satisfied). *Life Satisfaction* is measured on a scale from 0 (completely dissatisfied) to 10 (completely satisfied). *Baseline Risk* is a qualitative risk measure on a scale from 0 (very willing to take risks) to 10 (not at all willing to take risks). Data: SOEP-IS Sample I3.

Table A4: Personality Traits – Balance

| | Mean Treatment | Mean Control | p-value |
|---|---|---|---|
| Openness | -0.00 | 0.01 | 0.829 |
| Conscientiousness | -0.02 | -0.01 | 0.892 |
| Extraversion | 0.01 | 0.03 | 0.736 |
| Agreeableness | -0.02 | -0.00 | 0.820 |
| Neuroticism | 0.00 | 0.01 | 0.888 |
| Optimism | -0.01 | 0.05 | 0.343 |
| Relative Optimism | 0.01 | -0.01 | 0.776 |
| Locus of Control | 3.10 | 3.17 | 0.257 |
| Self Control | -0.04 | -0.06 | 0.773 |
| $Prob > F$ | | | 0.966 |

Notes: $^{*}$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.
Each row presents the means of *covariate* in the treatment and control group along with the p-values from separate OLS regressions of the form $Treated = \beta_0 + \beta_1 * Covariate + \epsilon_i$. $Prob > F$ is the p-value from an F-test for joint significance of all covariates. The Big 5 consist of *Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism*, which are standardized to a mean of zero and standard deviation of 1. *Optimism* indicates how respondents think about their future (*"If you think about the future: Are you... (1) optimistic; (2) rather optimistic than pessimistic; (3) rather pessimistic than optimistic; (4) pessimistic?"*). We recoded the variable, such that higher values reflect more optimism. *Relative optimism* is the unweighted average of four questions for which respondents had to indicate on a scale from 1 ("Very much less likely") to 7 ("Very much more likely") how they judged the likelihood to: (1) be financially successful; (2) become seriously ill; (3) be successful in their job; (4) be happy in general, relative to peers of the same age and sex. *Locus of Control (LoC)* is an equally weighted index of the LoC questions with higher values corresponding to more external beliefs. *Self-Control* is a standardized (mean zero, standard deviation 1) sum of 13 self-control indicators, in the spirit of Tangney et al. (2004). Data: SOEP-IS Sample I3.

Table A5: Correlates of Lottery Choice, Risk Aversion, and Locus of Control

| | Lottery Choice | | CRRA Parameter | | Locus of Control | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Female | -0.450*** | -0.332** | 1.185*** | 0.887** | 0.076 | 0.039 |
| | (0.149) | (0.149) | (0.415) | (0.408) | (0.078) | (0.073) |
| Age | 0.001 | 0.005 | 0.005 | -0.006 | 0.002 | 0.002 |
| | (0.004) | (0.006) | (0.011) | (0.017) | (0.002) | (0.003) |
| Education | 0.169*** | 0.121** | -0.399*** | -0.318** | -0.074*** | -0.045 |
| | (0.050) | (0.056) | (0.140) | (0.154) | (0.026) | (0.028) |
| Mother has Abitur | 0.226 | -0.230 | -0.944 | 0.419 | -0.080 | 0.113 |
| | (0.275) | (0.312) | (0.765) | (0.857) | (0.143) | (0.154) |
| Father has Abitur | 0.363* | 0.286 | -1.040* | -0.690 | -0.168 | -0.064 |
| | (0.213) | (0.235) | (0.596) | (0.647) | (0.111) | (0.116) |
| Income (net/month) | 0.013* | 0.000 | -0.033* | -0.006 | -0.018*** | -0.011*** |
| | (0.007) | (0.008) | (0.020) | (0.022) | (0.004) | (0.004) |
| Home owner | 0.111 | 0.097 | -0.112 | -0.191 | -0.129* | -0.061 |
| | (0.150) | (0.161) | (0.418) | (0.442) | (0.078) | (0.079) |
| Married | -0.173 | -0.348** | 0.914** | 1.314*** | 0.001 | 0.149* |
| | (0.150) | (0.160) | (0.416) | (0.439) | (0.078) | (0.079) |
| Self employed | 0.444 | 0.058 | -0.733 | 0.297 | -0.073 | 0.101 |
| | (0.343) | (0.356) | (0.969) | (0.982) | (0.178) | (0.175) |
| Unemployed | -0.761** | -0.575* | 1.624* | 1.196 | 0.626*** | 0.262 |
| | (0.311) | (0.337) | (0.876) | (0.930) | (0.160) | (0.166) |
| Retired | -0.109 | -0.222 | 0.408 | 0.404 | 0.012 | -0.024 |
| | (0.164) | (0.245) | (0.459) | (0.677) | (0.085) | (0.120) |
| East Germany | -0.121 | -0.118 | 0.736 | 0.793 | 0.112 | 0.001 |
| | (0.190) | (0.192) | (0.535) | (0.532) | (0.099) | (0.095) |
| Satisfaction with Health | 0.063* | 0.022 | -0.157* | -0.039 | -0.071*** | 0.004 |
| | (0.034) | (0.040) | (0.095) | (0.109) | (0.017) | (0.020) |
| Life Satisfaction | 0.085* | 0.067 | -0.181 | -0.157 | -0.165*** | -0.123*** |
| | (0.047) | (0.054) | (0.132) | (0.149) | (0.023) | (0.027) |
| Baseline Risk | -0.195*** | -0.183** | 0.567*** | 0.546*** | 0.050 | 0.028 |
| | (0.075) | (0.075) | (0.211) | (0.209) | (0.039) | (0.037) |
| Optimism | -0.058 | -0.114 | 0.155 | 0.305 | -0.205*** | -0.137*** |
| | (0.076) | (0.079) | (0.212) | (0.217) | (0.038) | (0.039) |
| Observations | | 446 | | 446 | | 446 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variables are the lottery choice in columns 1-2, the CRRA parameter $\rho$ (with higher values indicating less tolerance for risk) in colums 3-4, and Locus of Control (with higher values indicating higher control beliefs – external LoC) in columns 5-6. Data from control group only, interval regressions in columns 3-4 and otherwise OLS regressions (with standard errors in parentheses). Odd-numbered columns display coefficients from separate regressions for each covariate, while even-numbered columns report a multivariate regression including all covariates at once. *Education* is measured in 7 categories according to the International Standard Classification of Education (ISCED), with higher categories representing a higher level of education. *Mother (Father) has Abitur* indicates a parent with qualification for university admission (Abitur is the final exam at the end of high school). *Income* is the equivalence scale determined by the square root scale (i.e., we divide the monthly household net income by the square root of the number of household members) and *Homeowner* identifies respondents who own their house or apartment. *Female, Married, Self-employed, Unemployed, and Retired* are indicator variables. *East Germany* is an indicator for respondents who live in East Germany. *Satisfaction with health* is measured one a scale from 0 (completely dissatisfied) to 10 (completely satisfied). *Life Satisfaction* is measured one a scale from 0 (completely dissatisfied) to 10 (completely satisfied). *Baseline Risk* is a qualitative risk measure on a scale from 0 (very willing to take risks) to 10 (not at all willing to take risks), standardized using the sample mean and standard deviation. *Optimism* is measured on a scale from 1 (optimistic) to 4 (pessimistic) and recoded such that higher values reflect more optimism. Data: SOEP-IS Sample I3.

Table A6: Manipulation Check: Additional Outcomes

| | Credibility Data | LoC | Self-esteem | Mood | Emotional |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Treated | 0.006 | -0.059 | 0.036 | 0.553 | -1.443 |
| | (0.050) | (0.064) | (0.084) | (1.299) | (1.270) |
| Control Group Mean | 3.706*** | 3.258*** | 5.241*** | 63.898*** | 90.415*** |
| | (0.036) | (0.045) | (0.060) | (0.913) | (0.892) |
| Sample | respondi | respondi | respondi | SOEP-IS | SOEP-IS |
| Observations | 980 | 980 | 980 | 914 | 914 |
| R2 | 0.07 | 0.09 | 0.09 | 0.08 | 0.05 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
OLS regression with standard errors in parentheses. Columns (1–3) based on respondi sample (see Section A.2) and columns (4–5) based on SOEP-IS Data. "Credibility Data" measures the credibility of the data on wealth categories ('The data on wealth categories comes from the Bundesbank. How credible do you consider these data to be?"; scale: 1 – not credible to 5 – very credible), "LoC" is an index for internal and external locus of control measured on a scale from 1 (internal) to 7 (external), "Self-esteem" measures a positive self-attitude ("I have a positive attitude towards myself."; scale: 1 – does not apply at all to 7 – does apply), and "Mood" and "Emotional" are subscales of the SF12-Health Inventory measuring mood and limitations due to emotional problems (on a scale from 0 to 100). Covariates include age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), homeownership, and region (East/West Germany). Data: SOEP-IS Sample I3 and respondi.

Table A7: Non-participation in the survey module

Panel a.)
Non-participation in treatment and control

| | Treatment | Control Mean | N |
|---|---|---|---|
| Non-participation | 0.030 | 0.165 | 1,115 |
| | (0.023) | (0.016) | |

Panel b.)
Baseline difference in risk aversion between participation and non-participation

| | Non-participation | Participation | N |
|---|---|---|---|
| Baseline Risk | -0.152 | 5.078 | 1,115 |
| | (0.185) | (0.078) | |

Panel c.)
Baseline difference in risk aversion of non-participators in treatment and control

| | Treatment | Control | N |
|---|---|---|---|
| Baseline Risk | 0.004 | 4.923 | 201 |
| | (0.328) | (0.242) | |

Notes: $^{*}$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.
OLS regressions with standard errors in parentheses. Panel a) reports the difference in the likelihood of non-participation in treatment versus control (column Treatment) from regressing an indicator for non-participation on a treatment indicator. Panel b) reports the difference in baseline risk aversion between participating and non-participating respondents from regressing baseline risk aversion on an indicator of non-participation. Panel c) displays the difference in baseline risk aversion of non-participating respondents in treatment versus control (column Treatment) from regressing baseline risk aversion on a treatment indicator using non-participating respondents only. *Baseline Risk* is measured prior to the treatment on a scale from very willing to take risks (0) to not very willing to take risks (10). Data: SOEP-IS Sample I3.

Table A8: Results for Inverse Probability Re-Weighting

| | CRRA Parameter | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Treated | -0.560* | -0.602** | -0.570** | -0.592** | -0.594** | -0.596** | -0.602** | -0.602** |
| | (0.290) | (0.284) | (0.290) | (0.284) | (0.285) | (0.286) | (0.287) | (0.289) |
| Treated x LoC | | | -0.895*** | -0.939*** | -0.909*** | -0.943*** | -0.926*** | -0.897*** |
| | | | (0.300) | (0.297) | (0.297) | (0.296) | (0.304) | (0.303) |
| LoC | | | 0.583** | 0.372 | 0.310 | 0.382 | 0.393 | 0.325 |
| | | | (0.227) | (0.235) | (0.239) | (0.236) | (0.248) | (0.248) |
| Covariates | No | Yes | No | Yes | Yes | Yes | Yes | Yes |
| Big 5 | No | No | No | No | Yes | No | No | Yes |
| Optimism | No | No | No | No | No | Yes | No | Yes |
| Self-Control | No | No | No | No | No | No | Yes | Yes |
| Observations | 914 | 914 | 914 | 914 | 914 | 914 | 879 | 879 |
| Log-Likelihood | -2476.81 | -2451.99 | -2470.69 | -2444.97 | -2442.00 | -2444.88 | -2345.60 | -2341.58 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Interval regressions with standard errors in parentheses. Observations weighted by the inverse of the probability that they are part of our study sample. The propensity scores stem from a probit regression of an indicator for respondents in the study sample on the following covariates: age, equivalized net income, education, household size, satisfaction with health, life satisfaction, wealth and indicators for gender, marital status, employment status (self-employed, retired, unemployed), region (East/West Germany), homeownership, qualification for university (Abitur) of mother and father, and baseline risk aversion. *Big 5* consist of *Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism*, which are standardized to a mean of zero and standard deviation of 1. *Optimism* indicates how respondents think about their future (*"If you think about the future: Are you... (1) optimistic; (2) rather optimistic than pessimistic; (3) rather pessimistic than optimistic; (4) pessimistic?"*). We recoded the variable, such that higher values reflect more optimism. *Self-Control* is the standardized sum of 13 self-control items, following Tangney et al. (2004). Higher values imply more indicated self-control. Data: SOEP-IS Sample I3.

Table A9: Treatment Effect on the Propensity to Choose the Safe Lottery Option

| | Full Sample | Above Median LOC (External) | Below Median LOC (Internal) |
|---|---|---|---|
| | (1) | (2) | (3) |
| Treated | -0.053** | -0.138*** | 0.025 |
| | (0.027) | (0.038) | (0.038) |
| Constant | 0.171* | 0.083 | 0.260 |
| | (0.103) | (0.136) | (0.164) |
| Covariates | Yes | Yes | Yes |
| Observations | 914 | 452 | 462 |
| $R^2$ | 0.04 | 0.08 | 0.05 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
OLS regressions with robust standard errors in parentheses. The dependent variable is an indicator for choosing lottery 1 (sure pay-off of 50€), instead of any other lottery option (see Table A1). Column (1) uses the full sample for the estimation, column (2) limits the sample to individuals with above median locus of control (externals), and column (3) restricts the sample to those with below median locus of control values (internals). Covariates include age, equivalized net income, education, household size, satisfaction with health, life satisfaction, and indicators for gender, marital status, employment status (self-employed, retired, unemployed), region (East/West Germany), homeownership, qualification for university (Abitur) of mother and father, and baseline risk aversion. Data: SOEP-IS Sample I3.

Table A10: Main Treatment Effects – Interval Midpoint

| | CRRA Parameter (midpoint) | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated | -0.486* | -0.498* | -0.491* | -0.501* | -0.508* | -0.498* |
| | (0.279) | (0.278) | (0.278) | (0.278) | (0.283) | (0.283) |
| Treated x LoC | -0.929*** | -0.953*** | -0.940*** | -0.956*** | -0.950*** | -0.940*** |
| | (0.280) | (0.278) | (0.279) | (0.278) | (0.284) | (0.286) |
| LoC | 0.561*** | 0.385* | 0.310 | 0.392* | 0.400* | 0.321 |
| | (0.206) | (0.213) | (0.218) | (0.214) | (0.225) | (0.228) |
| Covariates | No | Yes | Yes | Yes | Yes | Yes |
| Big 5 | No | No | Yes | No | No | Yes |
| Optimism | No | No | No | Yes | No | Yes |
| Self-Control | No | No | No | No | Yes | Yes |
| Observations | 914 | 914 | 914 | 914 | 879 | 879 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
OLS regressions with standard errors in parentheses. Dependent variable is the midpoint of CRRA intervals (see Table A1, for the left- and right-censored interval, we use the upper and lower bound). Lower values indicate higher tolerance for risk. *LoC* is the z-score of a single index for locus of control, constructed as detailed in Table A2. Higher values correspond to more external beliefs. Covariates include: age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), baseline risk aversion, homeownership, satisfaction with health, and region (East/West Germany). *Big 5* consist of *Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism*, which are standardized to a mean of zero and standard deviation of 1. *Optimism* indicates how respondents think about their future (*"If you think about the future: Are you... (1) optimistic; (2) rather optimistic than pessimistic; (3) rather pessimistic than optimistic; (4) pessimistic?"*). We recoded the variable, such that higher values reflect more optimism. *Self-Control* is the standardized sum of 13 self-control items, following Tangney et al. (2004). Higher values imply more indicated self-control. Data: SOEP-IS Sample I3.

Table A11: Heterogeneous Effects – Separate Internal and External LoC

| | CRRA Parameter | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated | -0.523* | -0.553** | -0.550** | -0.555** | -0.549* | -0.544* |
| | (0.281) | (0.277) | (0.276) | (0.277) | (0.281) | (0.280) |
| Treated x External Scale | -0.790*** | -0.818*** | -0.793*** | -0.820*** | -0.853*** | -0.833*** |
| | (0.287) | (0.281) | (0.282) | (0.282) | (0.286) | (0.286) |
| External Scale | 0.535*** | 0.311 | 0.236 | 0.315 | 0.351 | 0.272 |
| | (0.207) | (0.209) | (0.216) | (0.210) | (0.222) | (0.226) |
| Treated x Internal Scale | -0.279 | -0.253 | -0.270 | -0.253 | -0.045 | -0.050 |
| | (0.285) | (0.281) | (0.281) | (0.281) | (0.289) | (0.289) |
| Internal Scale | -0.025 | -0.007 | 0.021 | -0.005 | -0.105 | -0.077 |
| | (0.204) | (0.206) | (0.207) | (0.206) | (0.211) | (0.212) |
| Covariates | No | Yes | Yes | Yes | Yes | Yes |
| Big 5 | No | No | Yes | No | No | Yes |
| Optimism | No | No | No | Yes | No | Yes |
| Self-Control | No | No | No | No | Yes | Yes |
| Observations | 914 | 914 | 914 | 914 | 879 | 879 |
| Log-Likelihood | -2071.57 | -2049.45 | -2047.29 | -2049.42 | -1972.80 | -1969.92 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Interval regressions with standard errors in parentheses. Dependent variable is the CRRA parameter $\rho$ (with lower values indicating higher tolerance for risk). External and internal scale constructed as in Table A2. Both are standardized z-scores. Covariates include: age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), baseline risk aversion, homeownership, satisfaction with health, and region (East/West Germany). *Big 5* consist of *Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism*, which are standardized to a mean of zero and standard deviation of 1. *Optimism* indicates how respondents think about their future (*"If you think about the future: Are you... (1) optimistic; (2) rather optimistic than pessimistic; (3) rather pessimistic than optimistic; (4) pessimistic?"*). We recoded the variable, such that higher values reflect more optimism. *Self-Control* is the standardized sum of 13 self-control items, following Tangney et al. (2004). Higher values imply more indicated self-control. Data: SOEP-IS Sample I3.

Table A12: Heterogeneous Effects - Locus of Control & Other Personality Traits

| | CRRA Parameter | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated | -0.525* | -0.551** | -0.551** | -0.554** | -0.555** | -0.552** |
| | (0.282) | (0.277) | (0.277) | (0.277) | (0.281) | (0.281) |
| Treated x LoC | -0.917*** | -0.952*** | -0.928*** | -0.955*** | -0.937*** | -0.916*** |
| | (0.284) | (0.278) | (0.279) | (0.278) | (0.283) | (0.284) |
| LoC | 0.589*** | 0.385* | 0.330 | 0.393* | 0.409* | 0.346 |
| | (0.209) | (0.213) | (0.218) | (0.215) | (0.224) | (0.227) |
| Covariates | No | Yes | Yes | Yes | Yes | Yes |
| Big 5 | No | No | Yes | No | No | Yes |
| Optimism | No | No | No | Yes | No | Yes |
| Self-Control | No | No | No | No | Yes | Yes |
| Observations | 914 | 914 | 914 | 914 | 879 | 879 |
| Log-Likelihood | -2071.99 | -2049.49 | -2047.34 | -2049.43 | -1972.53 | -1969.60 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Interval regressions with standard errors in parentheses. Dependent variable is the CRRA parameter $\rho$ (with lower values indicating higher tolerance for risk). *LoC* is the z-score of a single index for locus of control, constructed as detailed in Table A2. Higher values correspond to more external beliefs. Covariates include: age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), baseline risk aversion, homeownership, satisfaction with health, life satisfaction, region (East/West Germany), and baseline risk aversion. *Big 5* consist of *Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism*, which are standardized to a mean of zero and standard deviation of 1. *Optimism* indicates how respondents think about their future (*"If you think about the future: Are you... (1) optimistic; (2) rather optimistic than pessimistic; (3) rather pessimistic than optimistic; (4) pessimistic?"*). We recoded the variable, such that higher values reflect more optimism. *Self-Control* is the standardized sum of 13 self-control items, following Tangney et al. (2004). Higher values imply more indicated self-control. Data: SOEP-IS Sample I3.

Table A13: Heterogeneous Effects – Other Personality Traits

| | CRRA Parameter | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) Neuroticism | (2) Agreeableness | (3) Extraversion | (4) Openness | (5) Conscientiousness | (6) Optimism | (7) Self-Control |
| Treated | -0.561** | -0.571** | -0.563** | -0.564** | -0.562** | -0.558** | -0.559** |
| | (0.278) | (0.279) | (0.279) | (0.278) | (0.279) | (0.279) | (0.282) |
| Interaction Effect | -0.119 | 0.048 | 0.059 | 0.307 | 0.078 | -0.300 | -0.170 |
| | (0.280) | (0.278) | (0.283) | (0.282) | (0.278) | (0.284) | (0.282) |
| Level Effect | 0.309 | 0.150 | -0.038 | -0.115 | 0.043 | 0.191 | 0.284 |
| | (0.200) | (0.199) | (0.211) | (0.206) | (0.203) | (0.206) | (0.205) |
| Observations | 914 | 914 | 914 | 914 | 914 | 914 | 879 |
| Log-Likelihood | -2054.04 | -2054.89 | -2055.62 | -2055.01 | -2055.43 | -2055.04 | -1978.04 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Interval regressions with standard errors in parentheses. Dependent variable is the CRRA parameter $\rho$ (with lower values indicating higher tolerance for risk). "Interaction Effect" is the interaction between Treated and the corresponding personality trait indicated on top of a column, while "Level Effect" corresponds to the association between personality trait and dependent variable. All personality traits are standardized to have a mean of zero and standard deviation of one. Columns 1-5 show the *Big 5* traits and columns 6-7 indicate *Optimism* and *Self-Control* measures. *Optimism* indicates how respondents think about their future (*"If you think about the future: Are you... (1) optimistic; (2) rather optimistic than pessimistic; (3) rather pessimistic than optimistic; (4) pessimistic?"*). We recoded the variable, such that higher values reflect more optimism. *Self-Control* is the standardized sum of 13 self-control items, following Tangney et al. (2004). Higher values imply more indicated self-control. Data: SOEP-IS Sample I3.

Table A14: Heterogeneous Effects - Locus of Control & Emotions

| | CRRA Parameter | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated | -0.525* | -0.551** | -0.561** | -0.549** | -0.551** | -0.563** |
| | (0.282) | (0.277) | (0.277) | (0.277) | (0.277) | (0.276) |
| Treated x LoC | -0.917*** | -0.952*** | -0.946*** | -0.947*** | -0.950*** | -0.937*** |
| | (0.284) | (0.278) | (0.278) | (0.278) | (0.278) | (0.277) |
| LoC | 0.589*** | 0.385* | 0.415* | 0.348 | 0.391* | 0.388* |
| | (0.209) | (0.213) | (0.214) | (0.214) | (0.215) | (0.215) |
| Covariates | No | Yes | Yes | Yes | Yes | Yes |
| Happiness Index | No | No | Yes | No | No | Yes |
| Anger | No | No | No | Yes | No | Yes |
| Fear | No | No | No | No | Yes | Yes |
| Observations | 914 | 914 | 914 | 914 | 914 | 914 |
| Log-Likelihood | -2071.99 | -2049.49 | -2048.63 | -2047.42 | -2049.47 | -2045.55 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Interval regressions with standard errors in parentheses. Dependent variable is the CRRA parameter $\rho$ (with lower values indicating higher tolerance for risk). *LoC* is the z-score of a single index for locus of control, constructed as detailed in Table A2. Higher values correspond to more external beliefs. Covariates include: age, gender, education, parents' education, equivalized net income, marital status, household size, employment status (self-employed, unemployed, retired), baseline risk aversion, homeownership, satisfaction with health, life satisfaction, and region (East/West Germany). *Emotions* indicate the frequency of feeling *happy, sad, angry, and fearful* in the last four weeks and is measured on a scale from very rarely (1) to very often (5). *Happiness Index* is an unweighted index of happiness and sadness computed as $(happiness - sadness)/2 + 3$ to equal the range of the other emotions (Anger and Fear). Data: SOEP-IS Sample I3.

Table A15: Heterogeneous Effects - Emotions

| | CRRA Parameter | | |
|---|---|---|---|
| | (1) Happiness Index | (2) Anger | (3) Fear |
| Treated | -2.698* | -0.567 | -0.882 |
| | (1.405) | (0.822) | (0.622) |
| Interaction Effect | 0.589 | 0.013 | 0.196 |
| | (0.372) | (0.283) | (0.304) |
| Level Effect | -0.249 | 0.348* | 0.031 |
| | (0.257) | (0.193) | (0.222) |
| Observations | 914 | 914 | 914 |
| Log-Likelihood | -2076.16 | -2074.26 | -2076.82 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Interval regressions with standard errors in parentheses. Dependent variable is the CRRA parameter $\rho$ (with lower values indicating higher tolerance for risk). "Interaction Effect" is the interaction between Treated and the corresponding emotion indicated on top of a column, while "Level Effect" corresponds to the association between emotion and dependent variable. *Emotions* indicate the frequency of feeling *happy, sad, angry, and fearful* in the last four weeks and is measured on a scale from very rarely (1) to very often (5). *Happiness Index* is an unweighted index of happiness and sadness computed as $(happiness - sadness)/2 + 3$ to equal the range of the other emotions (Anger and Fear). Data: SOEP-IS Sample I3.

Table A16: Heterogeneous Effects - Socio-economic Characteristics

| | CRRA Parameter | | | |
|---|---|---|---|---|
| | (1) Female | (2) Unemployed | (3) Income | (4) Education |
| Treated | -0.297 | -0.456 | -3.731 | -0.989 |
| | (0.411) | (0.290) | (4.370) | (0.755) |
| Interaction Effect | -0.416 | -0.834 | 0.430 | 0.127 |
| | (0.563) | (1.270) | (0.577) | (0.191) |
| Level Effect | 1.166*** | 1.588* | -0.741* | -0.391*** |
| | (0.397) | (0.836) | (0.402) | (0.134) |
| Observations | 914 | 914 | 914 | 914 |
| Log-Likelihood | -2071.37 | -2075.30 | -2075.44 | -2071.30 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Interval regressions with standard errors in parentheses. Dependent variable is the CRRA parameter $\rho$ (with lower values indicating higher tolerance for risk). "Interaction Effect" is the interaction between Treated and the corresponding emotion indicated on top of a column, while "Level Effect" corresponds to the association between emotion and dependent variable. *Female* and *Unemployment* are indicators for gender and employment status. *Income* is the equivalence scale determined by the square root scale (i.e., we divide the monthly household net income by the square root of the number of household members). *Education* is measured in 7 categories according to the International Standard Classification of Education (ISCED), with higher categories representing a higher level of education. Data: SOEP-IS Sample I3.

Table A17: Inequality and Locus of Control

| | Risk Aversion | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Inequality: Gini | -1.185** | -0.756* | -0.169 | -0.275 |
| | (0.456) | (0.431) | (0.364) | (0.367) |
| Inequality x LoC | -0.482** | -0.322** | -0.295*** | -0.278** |
| | (0.200) | (0.160) | (0.110) | (0.118) |
| LoC | 0.253*** | 0.161*** | 0.164*** | 0.157*** |
| | (0.075) | (0.060) | (0.043) | (0.046) |
| Constant | 0.447** | -0.264 | -0.286* | -0.323** |
| | (0.171) | (0.233) | (0.145) | (0.132) |
| Individual Covariates | No | Yes | Yes | Yes |
| Region FE | No | No | Yes | Yes |
| Survey Year FE | No | No | No | Yes |
| Observations | 145,206 | 130,068 | 130,068 | 130,068 |
| Countries | 71 | 70 | 70 | 70 |
| $R^2$ | 0.02 | 0.09 | 0.11 | 0.12 |

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
OLS regressions on the relationship between income inequality and risk aversion using data from the *World Value Survey*. Standard errors, clustered at the country level, in parentheses. The dependent variable is Schwartz's risk sensation seeking measure. Higher values imply higher risk aversion. Inequality measured by the national-level Gini coefficient, after tax and transfers. Higher values imply higher inequality (Scale: 0 to 1). Locus of Control (LoC) is proxied by the standardized answers to the question: "Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Indicate how much freedom of choice and control you feel you have over the way your life turns out (Scale from 1 – "a great deal" – to 10 – "none at all")." *Individual covariates* include marital status, number children, subjective health status, satisfaction with financial situation of household, gender, age, education, and employment status. *Region FE* include the Arab World/Maghreb states, Latin Europe, post-Soviet countries, Eastern Europe, Nordic/Germanic countries, Latin American, South/East Asia, and Sub-Saharan Africa. The reference category is Anglo-Saxon countries. *Survey Year FE* is an indicator for wave 5 (base is wave 6). Data: World Values Survey: wave 5 and 6.

Table A18: Wealth Categories by Condition – Manipulation Check

| **Control Group** | **Treatment Group** |
|---|---|
| Up to 3,000€ | Up to 334,000€ |
| 3,001€ to 11,800€ | 334,001€ to 555,400€ |
| 11,801€ to 31,200€ | 555,401€ to 861,600€ |
| 31,201€ to 131,000€ | 861,601€ to 1,292,100€ |
| More than 131,000€ | More than 1,292,100€ |

Notes: Wealth categories used in the control and treatment condition. Upper bounds taken from 2017 Household Finance and Consumption Survey (HFCS, Deutsche Bundesbank, 2019).

## A.6 Survey Module – SOEP-IS

Our survey module consists of three parts: questions on personality traits, the treatment manipulation, and a lottery task to measure risk preferences. In what follows, we list the English wording of each question (translated from German).

**Optimism.** We measure optimism with two questions: a general question about optimism regarding the future taken from the SOEP, and a question about the likelihood of experiencing an event relative to an average person:

1. *When you think about the future: are you... [Scale: (i) ...optimistic, (ii) ...rather optimistic than pessimistic, (iii) ...rather pessimistic than optimistic, (iv) ...pessimistic?]*
2. *Compared to other people of the same age and gender as you: how likely is it that throughout your life you will...*
   - *...be financially successful?*
   - *...not suffer from a serious illness?*
   - *...be successful in your job?*
   - *...be satisfied overall?*

   For each component subjects could answer on a scale from 1 to 7, where 1 implies very much less likely, 4 implies as likely as the average person, and 7 implies very much more likely.

**Locus of Control.** We implemented the same ten items that are routinely used in the SOEP (Nolte et al., 1997). respondents answered on a Likert-scale ranging from 1 (disagree completely) to 7 (agree completely):

*The following statements capture different attitudes towards life and the future. To which degree do you personally agree with the statements?*

(i) *The course of my life is depending on me.*

(ii) *In comparison to others, I have not achieved what I deserve.*

(iii) *What you achieve in life, is first of all a question of fate or luck.*

(iv) *I often experience that others are deciding about my life.*

(v) *You have to work hard to be successful.*

(vi) *When I face difficulties in life, I often doubt my abilities.*

(vii) *Which opportunities I have in life is determined by social conditions.*

(viii) *More important than all effort, are the abilities you have.*

(ix) *I have little control over the things happening in my life.*

(x) *Social or political involvement can influence social conditions.*

**Treatment Manipulation.** Our treatment manipulation is embedded in a question about respondent's wealth. Specifically, we ask respondents to indicate their net wealth using five predefined wealth categories. To manipulate respondents' perception regarding the distribution of wealth, we randomly vary the available categories. That is, we assign half of the respondents to categories with relatively wide intervals (treatment group), while the other half of respondents is assigned to much smaller intervals (control group):

*Now I would like to talk with you about wealth. One can divide households in Germany into five categories of wealth. Wealth in this context refers to net wealth. That is, it is equivalent to total household wealth including cash, savings accounts, stocks and real estate, minus debts, such as loans, mortgages, or credit card debt. Please indicate to which category your household belongs:*

(i) *Up to €2,500 (**Treatment Group**: Up to €275,000)*

(ii) *€2,501 to €11,000 (€275,001 to €468,000)*

(iii) *€11,001 to €27,000 (€468,001 to €722,000)*

(iv) *€27,001 to €112,000 (€722,001 to €989,000)*

(v) *More than €112,001 (More than €989,001)*

**Risk Elicitation.** In the risk elicitation part respondents faced two questions. The first question asked them to indicate whether they would like to participate in a lottery game, whereas the second contained the actual lottery choice:

*Now let us turn to a special task with which we try to understand how people make financial decisions. We will present you with six lotteries. We ask you to choose one of the six lotteries. At the end of*

*this block of questions every 10th respondent will be randomly chosen to actually receive the winnings from their chosen lottery. The actual payment will be made at the end of the complete questionnaire. [Answers: (1) start the lottery game, (2) I do not want to participate because...*open].*

*I will now show you six different lotteries on the screen. Each lottery consists of two pay-offs, each of which can be drawn with equal probability. The lotteries differ in the sense that for each lottery you have an equal chance of winning different amounts of money. At the end of this module we will determine whether your choice will actually be paid out to you. Which lottery do you choose?*

(i) *Lottery 1: 50% 50€ / 50% 50€*

(ii) *Lottery 2: 50% 45€ / 50% 95€*

(iii) *Lottery 3: 50% 40€ / 50% 120€*

(iv) *Lottery 4: 50% 30€ / 50% 150€*

(v) *Lottery 5: 50% 10€ / 50% 190€*

(vi) *Lottery 6: 50% 0€ / 50% 200€*

**Top-10% income threshold.** *In your estimation, what gross annual income do you need to be in the top 10 percent of German households?*