Debt Aversion: Theory and Measurement*

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Abstract

Debt aversion can have severe adverse effects on financial decision-making. We propose a model of debt aversion, and conduct an experiment involving real debt and saving contracts, to elicit and jointly estimate debt aversion with preferences over time, risk, and losses. Structural estimations reveal that the vast majority of participants (89%) are debt averse and that this has a strong impact on choice. We estimate the "borrowing premium" – the compensation a debt averse person would require to accept getting into debt – to be around 16% of the principal for our average participant.

Keywords Debt Aversion · Intertemporal Choice · Risk and Time Preferences

JEL Classification D91 · D15 · C91

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1 Introduction

Rather go to bed without dinner than to rise in debt.
— Benjamin Franklin

Borrowing and saving decisions are among the most important and economically significant choices people face in their lives. An unwillingness to save may have severe implications such as insufficient retirement savings. In the same way, borrowing too much or too little can have negative economic consequences. Debt aversion, defined as an intrinsic unwillingness to take on debt, has received increased attention from researchers lately, for its adverse effects on financial decision-making such as failure to invest in tertiary education (Field, 2009; Caetano et al., 2019) and energy-efficient technologies (Schleich et al., 2021), or credit self-rationing of entrepreneurs (Nguyen et al., 2020).

However, in absence of a theory of debt aversion, it is difficult to measure debt aversion. To the best of our knowledge, no satisfactory theory or measurement exists so far. The difficulty to measure debt aversion stems from the fact that many other preferences and constraints may influence borrowing (and also saving) behavior. To illustrate this point, consider a prospective student who is deliberating about taking on a student loan to finance their studies. Clearly, time preferences, such as discounting and the elasticity of intertemporal substitution will influence this decision.[1] Moreover, if the repayment of the loan is counted as a future loss, loss aversion may affect this choice as well. To understand whether a person is truly debt averse, these other preferences need to be taken into consideration. Therefore, to cleanly identify debt aversion, a model is necessary that allows to disentangle and identify debt aversion separately from these other preferences.

The goal of this paper is to understand whether debt aversion exists as a preference in its own right, or whether it is merely an emergent behavioral property of other preferences, biases, beliefs, and constraints. To this end, we propose a formal model of debt aversion, and design and conduct an experiment to elicit and jointly estimate debt aversion with preferences over time, risk, and losses. Debt aversion is difficult to identify with field

[1] In the standard discounted utility model, the elasticity of intertemporal substitution is determined by the parameter of risk aversion. For convenience, we will make use of that assumption too, but test its implications.

data because many factors that influence borrowing and saving decisions are typically unobservable. Coming back to the student who considers accepting a student loan, this decision may be influenced by their belief about their individual future return of college education, their access to credit, peer effects, and many other potential factors that are not debt aversion. Lab experiments are an excellent tool in this case, as they allow to control for confounding factors, such as beliefs about potential returns or access to credit.

In the experiment participants can accept or reject a series of different debt and saving contracts involving real money, that is, participants can actually save and borrow with the experimenter. To identify debt aversion, we exploit the structural similarity of debt and saving contracts: both involve a gain and a loss of money separated by time. By comparing our participants' willingness to accept saving and debt contracts, we can thus identify debt aversion separately from other preferences such as time preferences, risk aversion, and loss aversion. Further, we include debt and saving contracts that are shifted into the future. In this way, we can separate an aversion to future payments from debt aversion, as saving contracts also include a payment obligation in the future.

We find that participants require much more favourable interest rates to accept borrowing contracts compared to saving contracts: Most participants require negative interest rates to accept borrowing contracts, while also requiring positive interest rates to save. To test our model of debt aversion against the data, we employ maximum likelihood estimations to structurally estimate the preference parameters of our model. The results confirm that participants are on average debt averse, thus establishing debt aversion as a dimension of individual preference in its own right, that is distinct from other relevant preferences. Comparing the choice of our average participant to a counterfactual debt neutral participant, reveals that debt aversion has a quantitatively meaningful impact on choice: Our participants require a "borrowing premium" of around 16% of the principal in order to accept getting into debt. Further, testing the relation of debt aversion and individual characteristics, we find a weak negative association between debt aversion and cognitive ability: People who score higher on our tests of cognitive ability have lower levels of debt aversion. Other individual characteristics, such as age, gender, financial literacy, and personality appear unrelated to debt aversion. To test for the potential interdependence of the different preference domains, we estimate the joint distribution of our preference parameters using simulated maximum likelihood estimations. We find that debt aversion is positively correlated with loss aversion, but not related to risk or time preferences. Further, according to our estimated distribution of the debt aversion parameter, we find that around 89% of individuals exhibit debt aversion. In an extension of the main experiment, using a subset of participants that received additional saving and borrowing choices, we try to explore potential mechanisms behind debt aversion. Results indicate that debt aversion increases in the time that people spend indebted. Finally, we demonstrate the robustness of debt aversion to a wide array of alternative modeling specifications.

In the following, we first provide an overview of the related literature in Section 1.1. In Section 2 we introduce the theoretical framework for modeling debt aversion and in Section 3 we describe the experiment. The results are reported in Section 4, and Section 5 provides a discussion of the findings and concluding remarks.

1.1 Related Literature

Our study connects to a growing literature on debt aversion. Existing theoretical work on debt aversion has produced models of intertemporal choice that feature debt aversion as an emergent behavioral property of other preferences. Loewenstein and Prelec (1992) present a model of intertemporal choice incorporating variable utility curvature as well as discounting for positive and negative money streams. Decision-makers in their model require much more favorable rates to borrow than to save. Prelec and Loewenstein (1998) introduce a framework that differentiates mental accounts for consumption and associated (loan) payments. The model allows the utility of consumption and disutility of payments to vary depending on the relative timing of consumption and payments. This so-called prospective accounting predicts aversion to debt where debt might either be seen as consuming before paying or receiving payment for future, yet undone work. Both frameworks explain debt averse behavior through variations in utility curvature, time discounting, and loss aversion. Advancing on the existing theoretical work, we aim to model debt aversion as a preference in its own right, that cannot be explained by preferences over time, risk and losses. To this end, we model debt aversion explicitly, while also accounting for other relevant preferences.

A large part of the empirical work on debt aversion focuses on its influence on investment in higher education, with somewhat mixed results. In field experiments offering differently labeled loan contracts to students, Field (2009) and Caetano et al. (2019) find that debt aversion might indeed deter investment in education and influence career choices. Using a representative survey on UK final year high-school students, (Callender and Jackson, 2005) find that more debt averse individuals, who often-times also have low socioeconomic status, are far less likely to actually go to university. Results on the existence of debt aversion among (prospective) students have later been supported by large-scale surveys for the US (Boatman et al., 2017) and the Netherlands (Oosterbeek and van den Broek, 2009). Furthermore, Gopalan et al. (2021) find that positive income shocks lead students to substantially decrease their debt, while non-students do not change their borrowing behavior. In contrast, Eckel et al. (2016) find little evidence that debt-aversion poses a barrier to investing in higher studies among a sample of Canadian adults. Besides investment in education, debt aversion has been associated with investment decisions by small and medium size business owners (Nguyen et al., 2020), with low uptake of debt-based public support programs related to COVID-19 (Paaso et al., 2020), with lower loan-to-income ratios and lower propensity to consume (Almenberg et al., 2021), and with hesitancy to invest in retrofit measures to increase the energy efficiency of private buildings (Schleich et al., 2021). Helka and Maison (2021) find that openness to being indebted is a far more important predictor of borrowing for hedonistic purposes than of borrowing for investments and necessities. Ikeda and Kang (2015) find more debt averse people in a sample of Japanese adults to engage less in activities they classify as overborrowing, such as taking unsecured consumer loans, engaging in debt restructuring, or declaring personal bankruptcy. Lastly, Almenberg et al. (2021) argue that individual debt attitudes are not only important, as a predictor of individual financial decision-making patterns, but seem to capture a cultural predisposition toward debt that is passed on across generations. Note that most of these studies either use measures of debt aversion that could potentially be confounded by other preferences and/or qualitative measures that ask participants for their stated debt aversion. Such qualitative measures are convenient to include in studies where time is critical, but it is not clear whether they actually measure debt aversion, as no validated survey module exists.[2] Also, in most field and survey settings, it is difficult to identify whether taking on debt would actually be optimal or not - making it hard to

[2]In a companion paper (Albrecht and Meissner, 2022), we develop such a module, based on choices in this experiment.

identify biases in borrowing behavior and thus debt aversion.

An advantage of lab experiments is that optimal saving and borrowing can be controlled by the experimenter, which allows to identify debt aversion. Meissner (2016) conducts an experiment in which participants play consumers in a life-cycle consumption problem. He creates two treatments, in which participants have to either save or borrow within an experimental session in order to consume optimally. He finds that people are on average less willing to borrow than to save in order to smooth consumption over the experimental life cycle. Ahrens et al. (2022) replicate Meissner (2016) using a student sample from the US and find similar levels of debt aversion. Duffy and Orland (2020) attribute sub-optimal borrowing on the extensive and intensive margin in an intertemporal consumption and saving experiment to debt aversion.[3] Focusing on debt repayment, rather than borrowing, Martínez-Marquina and Shi (2021) report that participants forgo profitable investments and substantial monetary gains in order to repay debt as soon as possible. Relatedly, Besharat et al. (2015) and Amar et al. (2019) find people to exhibit debt account aversion, i.e. when holding debt on multiple accounts, people tend to repay the account with the lowest outstanding debt first, to reduce the overall amount of debt accounts, despite forgoing monetary gains. These studies have in common, that debt and indebtedness is either entirely hypothetical or restricted to an experimental account. The latter arises in the context of consumption/saving experiments where monetary gains and losses, such as debt repayments, accumulate over the course of the experiment but real payments are never effected until participants receive their final payment at the end of the overall session. In contrast, we implement the first experiment, which actually encompasses real indebtedness: Participants may first receive a loan payout, take the money out of the lab, be indebted with the experimenter over a period of multiple weeks, and face the obligation to repay their debt afterward. Moreover, existing approaches only identify debt aversion on the aggregate level. Our study is the first attempt to identify and estimate a parameter of debt aversion on the individual level.[4]

Summing up, we are first to propose a theory of debt aversion, in which debt aversion is a preference in its own right rather than an emergent behavioral property of other pref-

[3]See Duffy (2016) for an overview of dynamic intertemporal consumption and saving experiments.

[4]Ahrens et al. (2022) introduce an individual index of debt aversion. However, this index does not measure debt aversion itself, as is constructed based on deviations from optimal consumption.

erences. We are also first to implement actual indebtedness in a laboratory experiment, which improves external validity compared to other experimental approaches in which indebtedness is only implemented hypothetically or within one experimental session. Finally, we are first to identify and to structurally estimate debt aversion on the individual level.

2 A Theory of Debt Aversion

We consider agents who choose between intertemporal prospects that are defined over streams of monetary gains or losses in up to two periods.[5] $\boldsymbol{x} = (x_t, x_T)$ denotes a stream of payments that offers x_t at time t, and x_T at time T, where $0 \leq t < T$. $X = (\boldsymbol{x}_1, p_1; \boldsymbol{x}_2, p_2; ...; \boldsymbol{x}_N, p_N)$ denotes an intertemporal prospect, that gives the payment stream $\boldsymbol{x}_n$ with probability p_n. The intertemporal utility is written as:

$$U(X) = \mathbb{E}\left[\phi(t)v(x_t) + \phi\left(T\right)v(x_T) - \mathbb{1}_{debt}c\left(\boldsymbol{x}\right)\right]$$

where $v(x_t)$ denotes atemporal utility of monetary gains and losses at time t. Agents discount future gains and losses with the discount function ϕ.

Saving contracts are payment streams characterized by $x_t < 0$ and $x_T > 0$. Inversely, *debt contracts* are payment streams characterized by $x_t > 0$ and $x_T < 0$. We allow agents to evaluate debt contracts differently than other contracts. To this end we introduce debt aversion as a cost of being in debt $c(\boldsymbol{x})$, which is only incurred for debt contracts:

$$\mathbb{1}_{debt} = \begin{cases} 1 & \text{if } x_t > 0 \text{ and } x_T < 0 \\ 0 & \text{otherwise.} \end{cases}$$

Following Prospect Theory (Kahneman and Tversky, 1979), we allow gains and losses of money to be evaluated differently, relative to a reference point ($x = 0$):

$$v(x) = \begin{cases} u(x) & \text{if } x \geq 0 \\ -\lambda u(-x) & \text{if } x < 0, \end{cases} \tag{1}$$

[5] The model can be generalized to n periods or continuous time. However, this makes the model considerably less tractable. As our experiment only involves trade-offs between payments in up to two periods, we favor the two-period approach.

where $u(x)$ is a utility function, evaluating deviations from the reference point.[6]

Finally, the utility cost of borrowing could take on many different forms. In our main specification, this cost is modeled to occur at the time of debt repayment, depending on the amount owed x_T:

$$c(\boldsymbol{x}) = (1-\gamma)\phi(T)v(x_T) \tag{2}$$

Here, γ is the parameter of debt aversion. A parameter of $\gamma = 1$ implies debt neutrality, $\gamma > 1$ implies debt aversion, and $\gamma < 1$ implies debt affinity. We chose this specification for two reasons. First, it captures debt aversion as a systematic discrimination of contracts based on the order of positive and negative money streams. Second, using this functional form ensures that the debt aversion parameter scales the disutility associated with the loss of having to repay the owed amount in a similar way as the parameter of loss aversion in a standard prospect theory model. To illustrate both points, note that the intertemporal utility of a deterministic saving contract simplifies to:

$$U(X) = -\lambda\phi(t)u(-x_t) + \phi(T)u(x_T), \tag{3}$$

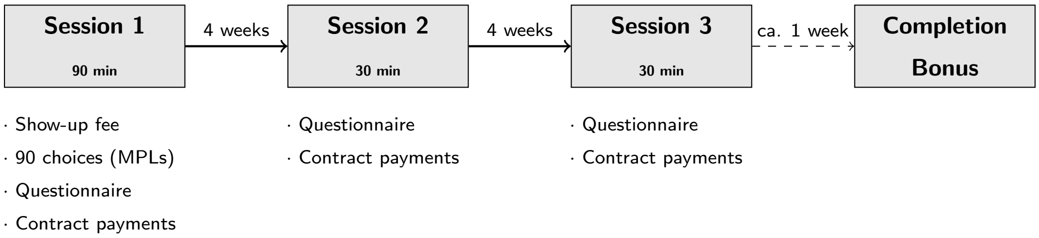
while the utility of a deterministic debt contract collapses to:

$$U(X) = \phi(t)u(x_t) - \lambda\gamma\phi(T)u(-x_T) \tag{4}$$

Further, note that the cost of being in debt is assumed to be discounted with $\phi(T)$. As a consequence, the effect of debt aversion lessens the further a repayment is shifted to the future. We consider alternative specifications of debt aversion in Section 4.2 and Online Appendix D, including variants where the cost of being in debt is a fixed cost for all debt contracts, and variants where the cost of being in debt is allowed to depend on the time an agent spends in debt, $T - t$. Regardless of the chosen specification, debt aversion is a robust finding in our data.

[6] Note that in our experimental setting, potential losses can only take one value: €-15. Thus, the curvature of utility in the loss domain cannot affect choices in our experiment. We therefore make the simplifying assumption of equal curvature of utility in the gain and loss domain here. In principle, this assumption can easily be relaxed, and in the Online Appendix D we show that debt aversion is empirically robust to this assumption.

Figure 1: Timeline of the experiment



3 Experiment

We utilized multiple price list (MPL) based choices to elicit preferences over saving and borrowing, as well as time discounting, risk aversion, and loss aversion. As depicted in Figure 1 we introduce a real-time dimension, by requiring participants to come to the laboratory on a total of three dates, equally spaced four weeks apart. This ensured that we could offer and enforce real saving and debt contracts. All payment-relevant choices were made in the first session, lasting around 90 minutes. Four and eight weeks after the first session, Session 2 and 3 took place. In all three sessions, participants were asked to answer questionnaires, and all payments based on participants' choices were paid to the participants or collected from them.

The main experiment consisted of a total of 90 binary choices, defined over payments at different points in time, lotteries, as well as saving and debt contracts. All 90 choices are displayed to participants one at a time. In this way, we reduce the complexity of decisions to be made by participants. Nevertheless, we will refer to the underlying MPLs for expository purposes throughout the paper. The 90 choices can be grouped into seven MPLs (see Table 1).[7] We adapted this common elicitation method for risk and time preferences, going back to Coller and Williams (1999); Harrison et al. (2002) and Holt and Laury (2002), to also elicit preferences over losses, as well as debt and savings. While the order in which participants completed the MPLs were fixed, within each MPL the order of sequentially displayed choices was randomized.

The first three MPLs elicit risk and time preferences. MPL1 offers the choice between a varying amount at Session 1 and a fixed amount at Session 2. MPL2 and MPL3 offer the choice between safer and riskier lotteries.

[7] Appendix A contains details on all 90 choices.

Table 1: Stylized overview of choices

MPL	**Choice**	**Payment**		
		Session 1	Session 2	Session 3
1	receive money in Session 1 or 2	varying per choice €8-18.2	€18	–
2	safe amount or lottery in Session 1	varying safe amount (€1-30) or coin flip (€1 or 30)	–	–
3	safer lottery or or riskier lottery in Session 1	coin flip (€14 or 17) or riskier coin flips (EV: €9-23)	–	–
4	(not) accept savings contract	pay €15	receive €12-45	–
5	(not) accept savings contract	–	pay €15	receive €7-40
6	(not) accept debt contract	receive €3-31	pay €15	–
7	(not) accept debt contract	–	receive €3-33	pay €15

In order to identify loss aversion as well as preferences over saving and borrowing, we introduce MPL4 - MPL7. These MPLs consist of real saving and debt contracts. MPL4 comprises saving contracts, involving the payment of €15 by the participant to the experimenter in Session 1, followed by repayment from the experimenter to the participant at Session 2, that varies from choice to choice. MPL5 consists of similar saving contracts, shifted to the future by four weeks. Importantly, this generates contracts, that involve payments in the future, which are not debt repayments. MPL6 consists of real debt contracts offering a payment of €15 to the participant at Session 1, followed by a repayment by the participant to the experimenter at Session 2, that varies from choice to choice. MPL7 contains similar debt contracts as MPL6, but all payments are shifted to the future by four weeks. Considering saving and debt contracts in the future, allows to distinguish debt aversion from mere aversion to future payments, and to identify potential present bias. Note that in all choices involving debt and saving contracts, participants could either accept or reject each contract. Rejection implied that no further payments take place. The questionnaires asked participants about a number of individual characteristics, such as age, gender, cognitive ability, and financial literacy (see Online Appendix B). We also elicited preferences using non-incentivized survey items and asked participants about their actual saving and borrowing behavior outside of the experiment. These data are used in Albrecht and Meissner (2022) to identify a survey module that best predicts debt aversion as measured with this experiment.

3.1 Procedures

All participants were required to come to all three sessions, irrespective of their financial choices. The scheduling of sessions took into account that participants knew of potential conflicts with their university schedule at the time of sign-up. Moreover, the importance of attending all sessions was emphasized in the invitation emails as well as in person before the start of the experiment. It was announced that participants who fail to participate in all sessions for reasons other than force majeure will be exempted from payment of the completion bonus and will be counted as no-shows for the entire experiment, which leads to removal from the experimental participant pool. Informed consent to the rules and procedures of the experiment was indicated via electronic acceptance of the invitation and confirmed verbally at the lab facilities.

Data collection took place at the Behavioral and Experimental Economics Laboratory at Maastricht University during winter 2019/20, autumn 2020, and autumn 2021. A total of 148 participants (62 in winter 2019/20, 53 in autumn 2020, and 33 in autumn 2021) attended the opening session and hence made all choices relevant for the estimation of preferences. Over the course of the experiment, attrition amounted to 21, such that 127 participants (54 in winter 2019/20, 46 in autumn 2020, and 27 in autumn 2021) completed all three sessions.[8] All participants were recruited through ORSEE (Greiner, 2015). Around 74% followed an undergrad program and 25% pursued a masters degree. Their backgrounds ranged from music to law, with a clear mode in the field of business and

[8]Compared to other experiments conducted with the same participants pool these numbers seem normal, if not below average.

economics. The experiment was programmed and conducted using z-Tree (Fischbacher, 2007).[9]

3.2 Payment

At the end of the opening session and after completion of all payment-relevant choices, one decision was randomly drawn as the 'decision that counts'. The random draw was conducted with help of a bingo cage containing 90 numbered balls. Decision-based payouts for the whole experiment were determined by this decision. If the decision involved payments not only in the opening session, a physical, individualized contract delineating all payments to be made and received was drawn up and signed by the experimenter as well as the participant (see Online Appendix F). All payments due on the opening session were directly executed. Later payments were executed at the end of the respective session. Payments to the participants were always effected in cash. Participants were allowed to make payments to the experimenters in cash or via PayPal, to minimize the potential transaction burden of payment. All participants with due payments in later sessions received respective email reminders the day before the due date.[10]

In addition to the decision-based payments, all participants received a show-up fee of €15 for all three sessions at the beginning of the opening session. This money was handed to participants in cash before any decisions took place. As payments in MPL4 contained saving contracts that required participants to pay €15 to the experimenter in the first session, we allowed participants to pay this out of the show-up fee.

After completion of all three sessions and settlement of all due payments, participants received a completion bonus of €20. This payment was implemented via bank transfer and with a delay of one week, to prevent participants to settle any outstanding debt with the completion bonus. Had we paid the completion bonus in cash during the last session,

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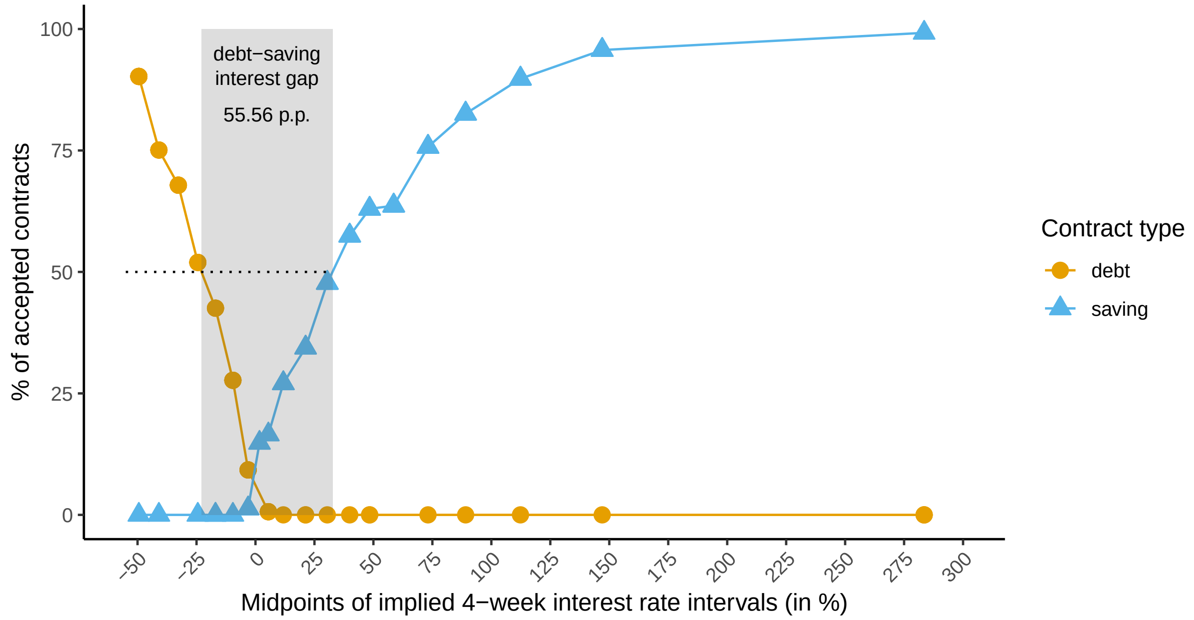
[9] The complete instructions can be found in Online Appendix E.

[10] To minimize the risk of confounding preference elicitation, the overall setup was directed at increasing perceived payment reliability, i.e. trust that promised payments by the experimenters will be made, and confidence that promised payments by the participants actually have to be made in the future. Undertaken measures included issuing physical contracts with contact details of the principal experimenter, emphasizing that the principal experimenter guarantees all payments in the experimental instructions, and providing multiple ways for contacting any of the experimenters and the associated economics department at Maastricht University in case any issues regarding payment should arise.

Figure 2: Share of accepted debt and saving contracts



Notes: The figure includes contracts of all different starting dates (now and in four weeks) and duration (four and eight weeks) for debt as well as saving. Contracts are binned into intervals of implied interest rates.

participants may not have thought that they are really in debt, which could have impeded the identification of debt aversion.[11]

4 Results

Figure 2 plots the percentage of accepted debt and saving contracts over all participants against the implied 4-week interest rate. The graph shows that participants require much more favorable rates to borrow than to save. Notably, most participants only accept debt

[11]Some experimental sessions in spring 2020 were affected by the closure of Dutch universities including the BEElab facilities at Maastricht University due to the COVID-19 pandemic. For 44 participants it was not possible to conduct Session 3 in the lab as planned. We transformed the respective experimental protocol to an online survey keeping all content identical and visual appearance as similar as possible. As cash payments were no longer possible, all payments were made via bank transfers. This only affected the collection of non-incentivized questionnaires in Session 3; all payment-relevant choices had been made in January 2020 before the COVID-19 pandemic hit Europe and the Netherlands. The same option to conduct Session 3 online was also offered to participants in autumn 2020 and 2021 who needed to quarantine.

contracts with negative interest rates. The interest rate at which half of the debt contracts are accepted is negative at −22.89%. To accept saving contracts, however, almost all participants require positive interest rates: the interest rate at which half of the contracts are accepted is 32.67%. The gap between required saving and borrowing interest rates for our median participant is thus substantial, at 55.56 percentage points. While this is a clear violation of discounted expected utility and a potential indication of debt aversion, it is not yet conclusive supporting evidence for debt aversion. As Loewenstein and Prelec (1992) point out, a gap between required interest rates for saving and borrowing decisions could be caused by other factors such as risk and loss aversion, present bias or combinations thereof.

In the following, we will therefore make use of structural estimations, that allow to isolate genuine debt aversion, while accounting for these other preferences. We will start in subsection 4.1 with our main specification, which estimates the model as specified in 2. We will then consider extensions and employ various robustness checks in subsection 4.2.

4.1 Main specification

To estimate preferences structurally, we require specific forms of the functions introduced in section 2. Below is a summary of our preferred specification. In section 4.2.4 we conduct a series of robustness checks to test whether our finding of debt aversion is robust to different specifications of these functional forms. Debt aversion remains robust. We assume normalized power utility to model curvature of utility in gains and losses:

$$u(x) = \frac{(x+\varepsilon)^{1-\alpha} - \varepsilon^{1-\alpha}}{1-\alpha} \tag{5}$$

For $\varepsilon = 0$, this function is characterized by constant relative risk aversion (CRRA). However, for values of α above unity and $\varepsilon = 0$, the derivatives of the utility function diverge around the reference point. We set $\varepsilon = 0.0001$, to maintain a close approximation of CRRA utility while ensuring that preferences are well-behaved around the reference point.[12] Moreover, in our main specification we assume exponential discounting:

$$\phi(\tau) = \frac{1}{(1+\delta)^{\tau}} \tag{6}$$

[12]See Wakker (2008) for an illustration, and Meissner et al. (2023) for a recent application.

Note that our experiment allows to identify other forms of discounting, such as quasi-hyperbolic discounting. In Section 4.2.2, we test a quasi-hyperbolic discount function (Laibson, 1997), but find no empirical support for present bias.

We will start out by estimating preference parameters on the aggregate, that is for our average participant. We will then account for observed heterogeneity, by allowing preference parameters to vary with observed individual characteristics. Finally, we will account for unobserved individual heterogeneity by estimating the joint population distribution of all preference parameters.

4.1.1 Aggregate Structural Estimation

We jointly estimate preference parameters for risk aversion, time discounting, loss aversion, and debt aversion, according to the model specified in Section 2, and broadly following the estimation strategies described in e.g. Andersen et al. (2008); Harrison and Rutström (2008) and Abdellaoui et al. (2019).

As the basis for all estimations, we consider a random utility model incorporating errors in the decision-making process. Decision-makers may make errors when evaluating the expected utility of different options captured by noise parameter μ. In particular, choices between options A and B are evaluated at their expected intertemporal utility, as specified in Equation 2 plus a stochastic error term ε. A decision-maker with preference parameters $\omega = (\alpha, \beta, \gamma, \lambda)$ chooses option B if $U(X^B, \omega) + \varepsilon^B \geq U(X^A, \omega) + \varepsilon^A$. The probability of observing choice B can then be written as:

$$P^B(\theta) = F\left(\frac{U(X^B, \omega) - U(X^A, \omega)}{\mu}\right) = F(\Delta U(\theta)), \tag{7}$$

where F is the cumulative distribution function of $(\varepsilon^A - \varepsilon^B)$ and $\theta = (\alpha, \delta, \gamma, \lambda, \mu)$ denotes the vector of preference parameters and the error parameter. We assume $(\varepsilon^A - \varepsilon^B)$ to follow a standard logistic distribution with $F(\xi) = (1+\mathrm{e}^{-\xi})^{-1}$ in our main specification. This specification is often termed Luce model (Luce et al., 1965; Holt and Laury, 2002) or Fechner error with logit link (Drichoutis and Lusk, 2014). Overall, we estimate four preference parameters and one error parameter: risk aversion α, time discounting δ, debt aversion γ, loss aversion λ, and the Fechner error μ, respectively. Intuitively, the error parameter can be interpreted as follows: for $\mu \to 0$ choice becomes deterministic, and

Table 2: Aggregate parameter estimates

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.643	0.036	1.0535	1.1074	0.4484
95% confidence interval	0.58 / 0.71	0.02 / 0.05	1.03 / 1.08	1.08 / 1.13	0.37 / 0.53
robust standard error	0.0345	0.006	0.0112	0.0118	0.0402
estimation details: n = 12240, log-likelihood = -4107.91, AIC = 8225.81, BIC = 8262.88, logit Fechner error					

Robust standard errors (SE) clustered at the individual level, 127 clusters

for $\mu \to \infty$, choice approaches uniform randomization. Aggregating over all choices and individuals the log-likelihood function writes as:

$$ln\,(L(\theta)) = \sum_i \sum_j \left[ln\,(F(\Delta U(\theta)))\,c_{ij} + ln(1 - F(\Delta U(\theta)))(1 - c_{ij})\right], \tag{8}$$

where $c_{ij} = 0$ if individual i chooses A in choice j and $c_{ij} = 1$ if individual i chooses B in choice j.

By maximizing the log-likelihood function over θ we derive point estimates for all preference parameters and the error parameter. These estimates describe preferences of the average decision-maker. To account for dependency of choices made by the same person we cluster standard errors at the individual level. Estimates are calculated using STATA's modified Newton-Raphson algorithm.

Estimation results are presented in Table 2.[13] Most importantly for this study, the estimate of the parameter indicating debt aversion $\gamma = 1.0535$ is significantly larger than one, suggesting that participants are on average debt averse. To put this estimate in perspective, a decision-maker with the preference parameters as in Table 2 would be indifferent between accepting or rejecting a debt contract that involves a loan amount of €20.93 today, with an associated repayment of €15 in four weeks. That is, our average participant would require a negative interest rate to accept a debt contract. This in itself,

[13] To check for potential multiplicity of maximum-likelihood solutions, we estimate the aggregate parameters from 100 combinations of randomly drawn starting values ($\alpha \sim U(0.5, 1)$; $\delta \sim U(0.5, 1)$; $\gamma \sim U(0.5, 1.5)$; $\lambda \sim U(0.5, 2.5)$; $\sigma \sim U(0, 2)$. Parameter estimates are virtually identical to the estimates reported in Table 2 for any of the tested combinations of starting values.

however, is not yet evidence of debt aversion, as other preferences such as loss aversion could potentially partly explain this. To understand the impact of debt aversion, we calculate what a counterfactual debt-neutral decision-maker with the same preferences, except $\gamma = 1$, would do. Such a decision-maker would accept a loan already as soon as it pays at least €18.08 today, everything else equal. Our average debt averse participant thus requires €2.85 more upfront, in order to be indifferent between accepting or rejecting a debt contract compared to the counterfactual debt-neutral decision-maker. We define the "borrowing premium" as the relative increase in the upfront payment (i.e. the principal) a debt averse person would require compared to a debt neutral person in order to accept a debt contract. For the average participant, this would be $2.85/18.08 = 15.76\%$. In other words, the average, debt averse decision-maker requires a borrowing premium of 15.76% larger loan sizes, while keeping repayment constant, to be willing to accept a debt contract compared to their debt-neutral counterpart. Importantly, debt aversion is not only statistically and economically significant but including debt aversion also meaningfully increases the model's performance relative to the benchmark assuming debt neutrality: Both AIC and BIC are reduced in the model including debt aversion.[14]

Regarding preferences other than debt aversion, participants are on average risk averse with a parameter of relative risk aversion $\alpha = 0.643$. This estimate is comparable to previous studies with large-scale samples using a similar utility specification. Andersen et al. (2008) find a parameter of relative risk aversion in the adult Danish population of 0.741, while Meissner et al. (2023) report 0.456 based on a representative sample from eight European countries. The four-week discount rate δ is estimated at around 0.036 which is in the range of other lab studies on time preferences as summarized by recent meta-study results (Matousek et al., 2021). Further, participants are on average loss averse, with $\lambda = 1.1074$. This is lower than estimates typically observed in the literature, where λ is usually found to be around 2 (Brown, Alexander L. and Imai, Taisuke and Vieider, Ferdinand and Camerer, Colin F., 2022). However, in most studies loss aversion is elicited with risky prospects, i.e. gains and losses are separated by state at one point in time. Abdellaoui et al. (2013) show that when gains and losses are separated by time and do not involve risk, such as in our savings and debt contracts, the loss aversion parameter

[14]Compared to the model assuming debt neutrality (see Online Appendix Table 22), AIC decreases by 38.67 and BIC decreases by 31.32.

is substantially lower with an estimate at around $\lambda = 1.15$.

Note that in our main specification, we are assuming that the elasticity of intertemporal substitution is the reciprocal of the parameter of risk aversion, and thus, that the elasticity of intertemporal substitution can be identified with the help of atemporal lottery choices. While this is a common assumption in the literature, there is considerable debate whether it is warranted (Andreoni and Sprenger, 2012). Andersen et al. (2008) were first to use utility curvature elicited with lotteries to correct the estimates of discount rates. Since then, most studies have found that while utility over time is also concave, it exhibits less curvature than utility over risk (Abdellaoui et al., 2013; Cheung, 2020). Further, while utility curvature over time appears to be different from utility curvature over risk, the two appear to be correlated (Meissner and Pfeiffer, 2022). For our study, correcting for utility curvature appears to be the most conservative approach with respect to the estimate of the debt aversion parameter. In Online Appendix D and Table 24 we relax this assumption and show that not accounting for utility curvature leads to considerably larger estimates of the debt aversion parameter.

4.1.2 Debt Aversion and Observable Individual Characteristics

In this section, we expand the previous aggregate estimation, by allowing preference and error parameters to vary with observable individual characteristics. Preference and error parameters are estimated as linear functions of individual characteristics including age, gender, cognitive ability, financial literacy, and personality traits as described in Table 3. The estimation results are presented in Table 4.

First, focusing on individual characteristics associated with debt aversion we can identify a weak negative association between debt aversion and cognitive ability: People who score higher on our measure of cognitive ability, which includes tests on cognitive reflection, numeracy, and fluid intelligence, appear to have lower levels of debt aversion. This finding is interesting, as it has the opposite sign of what is reported in Ahrens et al. (2022). They report a weak positive association. However, the two findings are difficult to compare, as different measures of individual debt aversion as well as cognitive ability are used.

Other individual characteristics, such as age, gender, financial literacy, and personality appear unrelated to debt aversion.

Table 3: Description of variables of observable characteristics

Variable label	**Variable description**
Age	Participant age in years
Cognitive ability	Number of correct answers in cognitive reflection, numeracy and raven tests weighted according to number of items per category (z-score, see Appendix Table 3 for more details)
Female	Dummy coded = 1 if female
Financial Literacy	Number of correct answers in financial literacy quiz (z-score)
Agreeableness	Big-5 personality trait agreeableness (z-score)
Conscientiousness	Big-5 personality trait conscientiousness (z-score)
Extraversion	Big-5 personality trait extraversion (z-score)
Negative emotionality	Big-5 personality trait negative emotionality (z-score)
Openmindedness	Big-5 personality trait open mindedness (z-score)

Further findings include a positive correlation between age and risk aversion and strong evidence for a negative correlation between age and loss aversion. These findings are in line with the thrust of the literature (Meissner et al., 2023). Finally, we find weak evidence suggesting that females are more risk but less loss averse and that people with higher agreeableness scores tend to be more loss averse.

4.1.3 Population Distributions of Parameters

As a further generalization, we account for unobserved heterogeneity of preferences between individuals in our sample by estimating a structural model of the joint distribution of preference parameters in the population as in Conte et al. (2011) and von Gaudecker et al. (2011). To this end, we extend our stochastic specification to be in line with the non-linear-mixed-logit routine introduced by (Andersen et al., 2012).

In particular, we assume that the vector of preference parameters and the error parameter $\theta = (\alpha, \delta, \gamma, \lambda, \mu)$ follows a joint normal distribution f with distribution hyperparameter vector Θ. Given the joint normal form, Θ comprises mean as well as standard

Table 4: Individual characteristics associated with preference parameters

	Risk aversion α	Discounting δ	Debt Aversion γ	Loss Aversion λ	Fechner error μ
Age	0.035	-0.003	-0.006	-0.012	-0.038
	(0.015)	(0.002)	(0.005)	(0.004)	(0.013)
Cognitive ability	-0.007	-0.012	-0.022	-0.015	-0.034
	(0.037)	(0.008)	(0.012)	(0.011)	(0.057)
Female	0.161	-0.008	0.010	-0.063	-0.283
	(0.097)	(0.015)	(0.034)	(0.038)	(0.158)
Financial literacy	-0.033	0.003	-0.003	-0.006	0.009
	(0.025)	(0.007)	(0.013)	(0.006)	(0.027)
Agreeableness	-0.027	0.005	0.004	0.013	0.010
	(0.027)	(0.005)	(0.010)	(0.007)	(0.026)
Conscientiousness	-0.040	-0.005	-0.016	0.005	0.055
	(0.037)	(0.007)	(0.014)	(0.014)	(0.050)
Extraversion	-0.005	-0.003	0.001	-0.005	0.003
	(0.051)	(0.009)	(0.014)	(0.010)	(0.059)
Negative emotionality	0.043	-0.002	-0.007	-0.015	-0.037
	(0.076)	(0.011)	(0.017)	(0.017)	(0.102)
Openmindedness	0.021	0.001	0.004	-0.014	-0.008
	(0.030)	(0.007)	(0.014)	(0.009)	(0.032)
Constant	-0.199	0.107	1.176	1.414	1.424
	(0.289)	(0.053)	(0.110)	(0.080)	(0.278)
N	12240				
Log. Likelihood	-3695				
BIC	7860				

Standard errors (clustered at the subject level) in parentheses

deviation for each parameter in θ and the covariances between all possible pairings of these parameters.

Let θ_i denote a realization of θ for a particular individual i. Analogously to Equation 7, in a particular decision, individual i will choose Option B, conditional on θ_i, with the following probability:

$$P_i^B(\theta_i) = F(\Delta U(\theta_i)) \tag{9}$$

Aggregating over all choices j, the probability of all observed choices by individual i is:

$$P_i(\theta_i) = \prod_j (P_{ij}^B(\theta_i) c_{ij} + (1 - P_{ij}^B(\theta_i))(1 - c_{ij})), \tag{10}$$

where, analogously to the aggregate specification, the index $c_{ij} = 0$ if individual i chooses Option A in choice j and $c_{ij} = 1$ if individual i chooses Option B in choice j. Deriving the probability of observed choices conditional on the population distribution hyper-parameters Θ rather than an individual realization θ_i involves integration over the distribution of θ:

$$P_i(\Theta) = \int P_i(\theta_i) \; f(\theta|\Theta) \; \mathrm{d}\theta \tag{11}$$

In particular, $P_i(\Theta)$ for any individual i is given by integrating over the weighted average of conditional probabilities of observed choices $P_i(\theta_i)$ aggregated over all choices j evaluated at different values of θ and weights given by the density of model parameters f. The log-likelihood function over all individuals then writes as:

$$ln \; L(\Theta) = \sum_i ln(P_i(\Theta)) \tag{12}$$

We maximize the log likelihood numerically, using simulated maximum likelihood, as suggested by Andersen et al. (2012) and reviewed earlier in Cameron and Trivedi (2005) and Train (2009). In particular, we employ STATA's modified Newton-Raphson algorithm to maximize the likelihood function in Equation 12. Resulting estimates of the distributional parameters for preferences over risk, time, losses and debt are displayed in Table 5 (means) and Table 6 (variance-covariance matrix). The two-dimensional cross-sections of the probability density function for all parameters are illustrated in Figure 3.

Distribution estimation results support the finding of debt aversion in the aggregate estimations: around 89% of the population is estimated to have a debt aversion parameter above one, i.e. exhibits debt aversion.

A key advantage of estimating the joint distribution of all preference parameters, including the variance-covariance matrix, is that we can identify correlations of the structural preference parameters based on covariances of the estimated population distributions. In this regard, we find that debt aversion is positively correlated with loss aversion,

Table 5: Maximum simulated likelihood estimates

	α risk aversion	δ discounting	γ debt aversion	λ loss aversion	μ Fechner error
mean	0.5319	0.0391	1.0639	1.1444	0.3116
95% CI	0.507 / 0.5567	0.0332 / 0.0449	1.0494 / 1.0783	1.1304 / 1.1585	0.2839 / 0.3393
SE	0.0127	0.003	0.0074	0.0072	0.0141

estimation details: n = 24480, log-likelihood = -2531.17, AIC = 5102.33, BIC = 5264.44, logit Fechner error

Standard errors (SE) clustered at the individual level, 127 clusters

Table 6: Variance-covariance matrix

		α risk aversion	δ discounting	γ debt aversion	λ loss aversion	μ Fechner error
α	**var/cov**	0.0317				
	95% CI	0.0271 / 0.0364				
	SE	0.0024				
δ		-0.0013	0.0013			
		-0.0023 / -0.0004	0.0008 / 0.0018			
		0.0005	0.0003			
γ		0.0004	0.0005	0.0027		
		-0.0019 / 0.0027	-0.0002 / 0.0013	0.0013 / 0.0041		
		0.0012	0.0004	0.0007		
λ		-0.0159	0.0042	0.0039	0.0249	
		-0.0183 / -0.0135	0.0034 / 0.0051	0.0014 / 0.0064	0.0204 / 0.0295	
		0.0012	0.0005	0.0013	0.0023	
μ		-0.0298	0.0041	0.0053	0.0264	0.0435
		-0.0345 / -0.025	0.0026 / 0.0056	0.0013 / 0.0093	0.0206 / 0.0321	0.0313 / 0.0558
		0.0024	0.0008	0.002	0.0029	0.0063

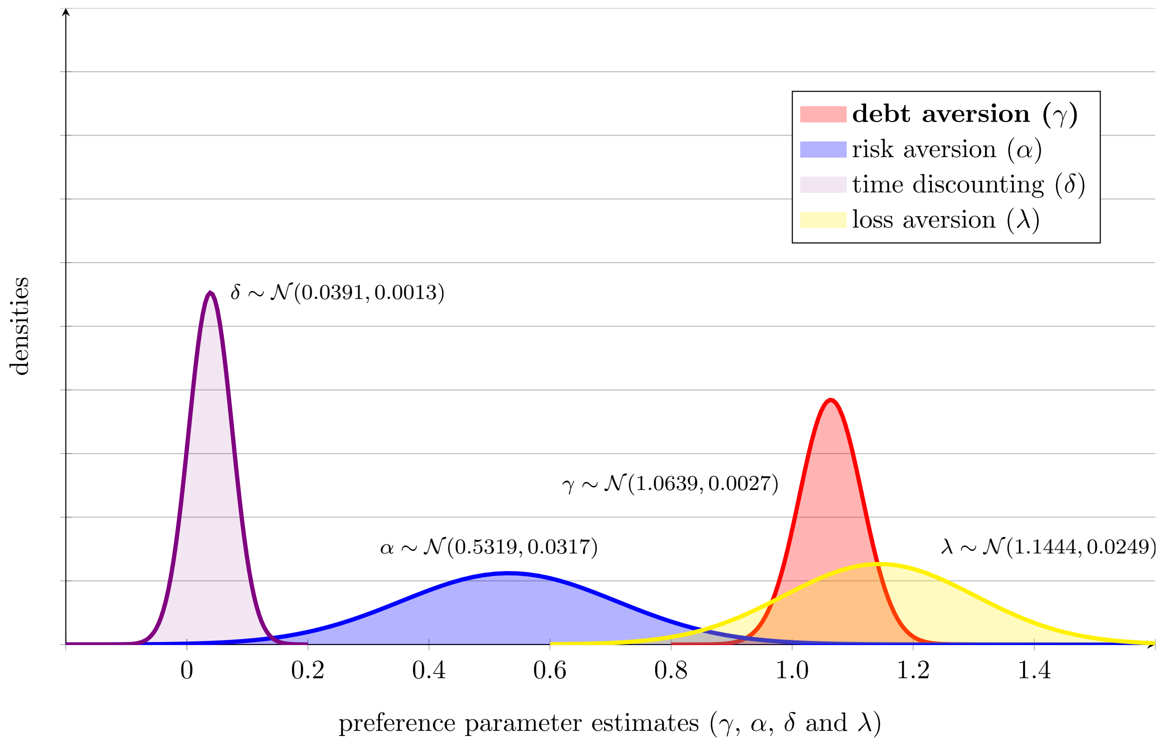
estimation details: n = 24480, log-likelihood = -2531.17, AIC = 5102.33, BIC = 5264.44, logit Fechner error

Standard errors (SE) clustered at the individual level, 127 clusters

with a correlation coefficient of $\rho = 0.4756$.[15] Notably, no other preference parameter appears to be correlated with debt aversion. Regarding preferences other than debt aversion,

[15]Pearson's correlation coefficient is calculated as $\rho_{x,y} = \frac{Cov_{x,y}}{\sigma_x \sigma_y}$ where Cov is the covariance as reported in Table 6, and σ denotes standard deviations, which can be retrieved as $\sqrt{var}$ using variances reported in Table 6.

Figure 3: Probability density functions of preference parameters



risk aversion appears to be negatively correlated with time discounting ($\rho = -0.2025$) and loss aversion ($\rho = -0.5659$), and time discounting is positively correlated with loss aversion ($\rho = 0.7382$). These results are in line with Schleich et al. (2019), who test for correlation of preference parameters in a large-scale multi-country representative survey.

4.2 Extensions and Robustness Checks

4.2.1 Duration of Indebtedness

In this extension, we aim to investigate potential mechanisms of how debt aversion takes effect. Specifically, we will test whether the cost of being in debt could depend on the time a person spends indebted. We find support that debt aversion does not only depend on the amount and timing of repayment but also substantially on the time of indebtedness.

To test this, we extended the main experiment in the final wave of data collection. This extended experiment contained 30 additional choices on savings and debt contracts spanning not four, but a longer period of eight weeks. The remaining 90 choices and all general procedures are the same as in the main experiment without extension. Just as in the 90 original choices, all payments to the experimenter in the additional choices are held constant at €15, i.e. all loans require the same amount of repayment.

We consider an extended model specification of debt aversion that additionally depends on the time of being indebted $T - t$:

$$c(\boldsymbol{x}) = (1 - \gamma\zeta^{(T-t-1)})\phi(T)v(x_T) \tag{13}$$

Maintaining the components and interpretation of the previous specification of debt aversion, in this extension ζ scales debt aversion based on the time of being indebted. In particular, $\zeta > 1$ implies increasing cost of being indebted if the time of being indebted increases, $\zeta = 1$ implies invariance of debt aversion with respect to time of indebtedness, and $\zeta < 1$ describes decreasing cost of being indebted if the time of indebtedness increases.

In this setting the utility of a short debt contract, i.e. $T - t = 1$, is the same as in the specification without debt duration dependent scaling of debt aversion (ζ):

$$U(x) = \phi(t)u(x_t) - \lambda\gamma\phi(T)u(-x_T), \tag{14}$$

for long debt contracts, i.e. $T - t = 2$ in the setting of our experiment, the utility of debt contracts simplifies to

$$U(x) = \phi(t)u(x_t) - \lambda\gamma\zeta\phi(T)u(-x_T) \tag{15}$$

Using aggregate maximum likelihood estimations and pooled choice data from the standard experiment with 90 choices and the extended experiment with 120 choices yields results as summarized in Table 7. Parameter estimates, including debt aversion as established in the main specification, remain largely unchanged. Interestingly, however, the debt duration aversion parameter ζ is significantly larger than one. This implies that the cost of being indebted increases in the time of indebtedness.

To illustrate what this implies in terms of behavior, the average decision-maker characterized by parameter estimates derived in the frame of the extended model is indifferent between accepting and rejecting a debt contract that offers a loan of €20.67 today and requires repayment of €15 in four weeks. However, the same decision-maker requires a

Table 7: Aggregate parameter estimates including debt duration aversion

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\zeta}$ debt duration aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6398	0.0429	1.0635	1.851	1.1007	0.448
95% CI	0.57 / 0.71	0.03 / 0.06	1.04 / 1.09	1.28 / 2.42	1.08 / 1.12	0.37 / 0.53
robust SE	0.034	0.0075	0.0134	0.2919	0.0121	0.0402
estimation details: n = 12240, log-likelihood = -4095.55, AIC = 8203.1, BIC = 8247.57, logit Fechner error						

Robust standard errors (SE) clustered at the individual level, 127 clusters

larger loan of €21.11 today if repayment of €15 is not due in four but eight weeks. In contrast, the hypothetical debt and debt duration neutral counterpart (i.e. $\gamma = 1$ and $\zeta = 1$), requires a four-week loan of size €17.43 and eight-week loan of size €15.51 to be indifferent. Based on the differences, we can calculate borrowing premia of 18.59% for short, four-week debt contracts and 36.10% for long, eight-week debt contracts. In other words, the borrowing premium increases by around 93% if the duration of indebtedness doubles. Note, however, that the identification of the debt duration aversion parameter relies on only 30 participants who completed the extended list of MPLs, and should therefore be interpreted with caution.

4.2.2 Present Bias

In principle, our experimental setup allows to identify present bias, as we include debt and saving contracts that are shifted into the future while maintaining the same temporal distance between involved dates. To test whether present bias is existent in our sample, we consider an alternative discount function, that incorporates quasi-hyperbolic discounting (Phelps and Pollak, 1968; Laibson, 1997):

$$\phi'(\tau) = \begin{cases} 1 & \text{if } \tau = 0 \\ \frac{1}{(1+\beta)} \frac{1}{(1+\delta)^{\tau}} & \text{if } \tau \neq 0. \end{cases} \tag{16}$$

In this specification, δ is the exponential discount rate, and β is the parameter that determines present bias. A parameter of $\beta > 0$ indicates present bias, $\beta = 0$ indicates

Table 8: Aggregate parameter estimates including present bias

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\beta}$ present bias	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6431	-0.0012	0.037	1.0545	1.1069	0.4484
95% CI	0.58 / 0.71	-0.01 / <.01	0.02 / 0.05	1.03 / 1.08	1.08 / 1.13	0.37 / 0.53
robust SE	0.0345	0.0029	0.0065	0.0114	0.012	0.0402

estimation details: n = 12240, log-likelihood = -4107.86, AIC = 8227.71, BIC = 8272.19, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 127 clusters

no present bias, and $\beta < 0$ indicates future bias. The results of the aggregate maximum likelihood estimation using this alternative specification are presented in Table 8. Present bias is estimated precisely at, and statistically indistinguishable from 0. The evidence against present bias also extends to a setting considering different parameters of present bias for gains and losses (see also Online Appendix D). These findings, appear in line with recent meta-study results on present bias elicited in experiments (Imai et al., 2020).[16]

4.2.3 Different utility curvature and time discounting for gains and losses

Following the argumentation in Loewenstein and Prelec (1992) debt averse behavior may be explained by a combination of different utility curvatures as well as discount rates for gains and losses. In their model, the combination of a steeper value function for losses than for gains and a larger discount factor for gains than for losses will result in debt aversion. We test whether debt aversion is robust to this by adapting our main specification such that we allow distinct risk aversion and time discounting parameters for gains and losses: $\alpha^+, \alpha^-, \delta^+$ and δ^- respectively. Consequently, atemporal utility takes the form

$$u(x) = \begin{cases} \frac{(x+\varepsilon)^{1-\alpha^+} - \varepsilon^{1-\alpha^+}}{1-\alpha^+} & \text{if } x \geq 0 \\ \frac{(x+\varepsilon)^{1-\alpha^-} - \varepsilon^{1-\alpha^-}}{1-\alpha^-} & \text{if } x < 0, \end{cases} \tag{17}$$

[16]For graphical evidence on the abscence of present bias, see Figure 4 in the Online Appendix, which shows that required interest rates for debt and saving contracts do not differ between contracts that are offered now and contracts that are shifted into the future.

Table 9: Aggregate parameter estimates with separate utility curvature and time discounting in the gain and loss domain

	α^+ RA gains	α^- RA losses	δ^+ TD gains	δ^- TD losses	γ debt aversion	λ loss aversion	μ Fechner error
point estimate	0.6425	0.7878	0.0369	0.0307	1.0485	1.0402	0.4484
95% CI	0.57 / 0.71	0.78 / 0.79	0.02 / 0.05	0.02 / 0.04	1.03 / 1.07	1.01 / 1.07	0.37 / 0.53
robust SE	0.0346	0.0016	0.0061	0.0062	0.0109	0.0146	0.0402

estimation details: n = 12240, log-likelihood = -4106.69, AIC = 8227.39, BIC = 8279.27, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 127 clusters

and the discount function ϕ now also depends on the sign of x:

$$\phi(\tau, x) = \begin{cases} \frac{1}{(1+\delta^+)^\tau} & \text{and } x \geq 0 \\ \frac{1}{(1+\delta^-)^\tau} & \text{and } x < 0. \end{cases} \tag{18}$$

Estimation results are presented in Table 9. In line with Loewenstein and Prelec (1992), we find $\alpha^+ < \alpha^-$ and $\delta^+ > \delta^-$, although only the difference in risk aversion is statistically significant ($P < 0.01$). Importantly, the debt aversion parameter remains significantly larger than one and has a similar magnitude compared to the debt aversion parameter in our main specification. This can be taken as evidence for debt aversion as a genuine preference that cannot be explained by differences in utility curvature and time discounting in the loss and gain domain.

4.2.4 Robustness Checks

Our finding of debt aversion may be sensitive to the assumptions underlying our estimations. We therefore employ a wide array of robustness checks. In particular, we first consider alternative forms of the cost of borrowing by modeling debt aversion as a fixed cost of being indebted as well as scaling of utility from borrowed money. Second, we alter various characteristics of our utility specification in general. These comprise abstracting from risk aversion as well as considering alternative forms of the utility function such as CARA utility and CRRA utility without ε-transformation. Third, we scrutinize different error structures: we introduce an additional tremble error, exchange the logit for a probit Fechner error, and allow distinct probit Fechner errors per choice domain. Moreover, we also test the effect of excluding participants who did not complete the entire experimental sequence or expressed some doubt about the trustworthiness of the experimental environment. Summing up the results, debt aversion remains robust regardless of the utilized functional forms and sample selection criteria. Detailed descriptions and results on all robustness checks can be found in Online Appendix D.

5 Discussion and conclusion

In this paper, we introduce a novel theoretical framework and experiment that allows to model and measure debt aversion. We are able to separately identify debt aversion from other relevant preferences, such as risk aversion, loss aversion, and time preferences. In this way, we aim to establish debt aversion as a preference in its own right, as opposed to an emergent behavioral property of other preferences, biases, beliefs, and constraints.

Using a structural maximum likelihood estimation, we find that our participants are on average debt averse. They would be willing to forgo a substantial amount of money in order to avoid getting into debt. We estimate the "borrowing premium" to be around 16%. This is the increase in the upfront payment our average participant would require compared to a counterfactual debt neutral participant to accept a debt contract. Testing how observed individual characteristics correlate with debt aversion, we find weak evidence supporting a negative correlation between debt aversion and cognitive ability. Other individual characteristics, such as age, gender, financial literacy, and personality appear unrelated to debt aversion. Further, we estimate the joint population distribution of all preference parameters, using simulated maximum likelihood. We find that a substantial share of 89% of our participants exhibits debt aversion. Furthermore, debt aversion appears to be correlated positively with loss aversion, but not with other preference parameters. Finally, we find evidence that debt aversion depends positively on the duration a person spends indebted. Notably, present bias does not appear to be existent in our data, and debt aversion remains robust after a series of robustness checks. Summing up, we find robust evidence supporting debt aversion as a preference in its own right. Most participants are debt averse, and debt aversion appears to have a meaningful impact on choice.

The existence of debt aversion could have far-reaching implications for individual financial decision-making. Debt averse individuals could invest less in otherwise profitable investment projects, such as education or energy-efficient technologies, and make consumption and saving decisions that deviate from the standard model of intertemporal choice. While we have made a first step in cleanly identifying debt aversion, many open questions on the mechanisms that underlie debt aversion, and its implications for financial decision-making, remain. We test a multitude of ways of modeling debt aversion, and while all specifications lend clear support to its existence, our setup is not well suited to discriminate between different models and different mechanisms of how debt aversion works. In an extension of the base experiment, we show that debt aversion appears to increase in the duration participants spend indebted, but many other interesting questions remain. We hope that our theoretical and experimental framework can pave the way for future research that could improve the knowledge on the exact mechanisms at play.

Debt aversion could also have implications on the macroeconomic level. Hundtofte et al. (2019) show that consistent with debt aversion, individuals in the US and Iceland are reluctant to use credit to smooth negative transitory income shocks. They argue that while standard theory predicts countercyclical credit demand, credit demand appears to be pro-cyclical which could deepen business cycle fluctuations.

Further, our findings also have implications for policy design. Many policies rely on offering favorable loans to subsidize particular behaviors, such as investment in tertiary education or energy-efficient technologies. However, in the face of a largely debt averse population, these loans might not be very effective. Moreover, if debt aversion correlates with individual characteristics, such as income or socioeconomic status, such policies could have unintended effects. For instance, loan-based policies to facilitate tertiary education for students from weak financial backgrounds might be particularly unattractive to these students if they are also more debt averse. For these reasons, we believe that more research on how debt aversion relates to individual characteristics of representative populations is required. To facilitate this, we have constructed a short and easy-to-use survey module for measuring individual debt aversion in a companion paper (Albrecht and Meissner, 2022). Using the data from this experiment, we identify a set of survey items that best predicts the debt aversion parameter as elicited with our experiment. The survey module contains two short items and predicts debt aversion reasonably well. We hope that this survey module will prove useful for future research on debt aversion on a larger scale, where complicated and incentivized experiments are often not feasible.

Finally, we believe that our setup provides a valuable methodological contribution. To our knowledge, we are first to put participants into actual debt in a laboratory experiment. As the vast majority of participants did not default on their obligations, we believe that such experiments could prove useful to analyze debt-related behavior in the future.

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Appendix

A Multiple Price Lists

Table 10: Multiple price list of intertemporal choices (MPL1)

Choice	Option A	Option B
1	Receive an amount of €18.2 today	Receive an amount of €18.0 in 4 weeks
2	Receive an amount of €18.0 today	Receive an amount of €18.0 in 4 weeks
3	Receive an amount of €17.8 today	Receive an amount of €18.0 in 4 weeks
4	Receive an amount of €17.3 today	Receive an amount of €18.0 in 4 weeks
5	Receive an amount of €16.8 today	Receive an amount of €18.0 in 4 weeks
6	Receive an amount of €16.0 today	Receive an amount of €18.0 in 4 weeks
7	Receive an amount of €14.0 today	Receive an amount of €18.0 in 4 weeks
8	Receive an amount of €12.0 today	Receive an amount of €18.0 in 4 weeks
9	Receive an amount of €10.0 today	Receive an amount of €18.0 in 4 weeks
10	Receive an amount of €8.0 today	Receive an amount of €18.0 in 4 weeks

Table 11: Multiple price list of certain payments vs. risky gambles (MPL2)

	Option A		Option B	
Choice	Coin shows Heads	Coin shows Tails	Coin shows Heads	Coin shows Tails
1	€30 today	€30 today	€30 today	€1 today
2	€25 today	€25 today	€30 today	€1 today
3	€20 today	€20 today	€30 today	€1 today
4	€17 today	€17 today	€30 today	€1 today
5	€16 today	€16 today	€30 today	€1 today
6	€15 today	€15 today	€30 today	€1 today
7	€12 today	€12 today	€30 today	€1 today
8	€10 today	€10 today	€30 today	€1 today
9	€5 today	€5 today	€30 today	€1 today
10	€1 today	€1 today	€30 today	€1 today

Table 12: Multiple price list of less risky vs. more risky gambles (MPL3)

	Option A		**Option B**	
Choice	Coin shows Heads	Coin shows Tails	Coin shows Heads	Coin shows Tails
1	€14 today	€17 today	€17 today	€1 today
2	€14 today	€17 today	€20 today	€1 today
3	€14 today	€17 today	€25 today	€1 today
4	€14 today	€17 today	€28 today	€1 today
5	€14 today	€17 today	€29 today	€1 today
6	€14 today	€17 today	€30 today	€2 today
7	€14 today	€17 today	€30 today	€3 today
8	€14 today	€17 today	€32 today	€8 today
9	€14 today	€17 today	€32 today	€10 today
10	€14 today	€17 today	€32 today	€14 today

Table 13: Multiple price list of 4-week saving contracts starting at Session 1 (MPL4)

	Early saving contracts	
Choice	Session 1 (today)	Session 2 (in 4 weeks)
1	Pay an amount of €15	Receive an amount of €45
2	Pay an amount of €15	Receive an amount of €40
3	Pay an amount of €15	Receive an amount of €36
4	Pay an amount of €15	Receive an amount of €34
5	Pay an amount of €15	Receive an amount of €32
6	Pay an amount of €15	Receive an amount of €30
7	Pay an amount of €15	Receive an amount of €28
8	Pay an amount of €15	Receive an amount of €26
9	Pay an amount of €15	Receive an amount of €24
10	Pay an amount of €15	Receive an amount of €22
11	Pay an amount of €15	Receive an amount of €20
12	Pay an amount of €15	Receive an amount of €18
13	Pay an amount of €15	Receive an amount of €16
14	Pay an amount of €15	Receive an amount of €14
15	Pay an amount of €15	Receive an amount of €12

Table 14: Multiple price list of 4-week saving contracts starting at Session 2 (MPL5)

	Late saving contracts	
Choice	Session 2 (in 4 weeks)	Session 3 (in 8 weeks)
1	Pay an amount of €15	Receive an amount of €40
2	Pay an amount of €15	Receive an amount of €35
3	Pay an amount of €15	Receive an amount of €31
4	Pay an amount of €15	Receive an amount of €29
5	Pay an amount of €15	Receive an amount of €27
6	Pay an amount of €15	Receive an amount of €25
7	Pay an amount of €15	Receive an amount of €23
8	Pay an amount of €15	Receive an amount of €21
9	Pay an amount of €15	Receive an amount of €19
10	Pay an amount of €15	Receive an amount of €17
11	Pay an amount of €15	Receive an amount of €15
12	Pay an amount of €15	Receive an amount of €13
13	Pay an amount of €15	Receive an amount of €11
14	Pay an amount of €15	Receive an amount of €9
15	Pay an amount of €15	Receive an amount of €7

Table 15: Multiple price list of 4-week debt contracts starting at Session 1 (MPL6)

	Early debt contracts	
Choice	Session 1 (today)	Session 2 (in 4 weeks)
1	Receive an amount of €31	Pay an amount of €15
2	Receive an amount of €27	Pay an amount of €15
3	Receive an amount of €24	Pay an amount of €15
4	Receive an amount of €21	Pay an amount of €15
5	Receive an amount of €19	Pay an amount of €15
6	Receive an amount of €17	Pay an amount of €15
7	Receive an amount of €16	Pay an amount of €15
8	Receive an amount of €15	Pay an amount of €15
9	Receive an amount of €14	Pay an amount of €15
10	Receive an amount of €13	Pay an amount of €15
11	Receive an amount of €11	Pay an amount of €15
12	Receive an amount of €9	Pay an amount of €15
13	Receive an amount of €7	Pay an amount of €15
14	Receive an amount of €5	Pay an amount of €15
15	Receive an amount of €3	Pay an amount of €15

Table 16: Multiple price list of 4-week debt contracts starting at Session 2 (MPL7)

Choice	**Late debt contracts**	
	Session 2 (in 4 weeks)	Session 3 (in 8 weeks)
1	Receive an amount of €33	Pay an amount of €15
2	Receive an amount of €30	Pay an amount of €15
3	Receive an amount of €27	Pay an amount of €15
4	Receive an amount of €24	Pay an amount of €15
5	Receive an amount of €22	Pay an amount of €15
6	Receive an amount of €20	Pay an amount of €15
7	Receive an amount of €18	Pay an amount of €15
8	Receive an amount of €16	Pay an amount of €15
9	Receive an amount of €15	Pay an amount of €15
10	Receive an amount of €14	Pay an amount of €15
11	Receive an amount of €12	Pay an amount of €15
12	Receive an amount of €10	Pay an amount of €15
13	Receive an amount of €8	Pay an amount of €15
14	Receive an amount of €6	Pay an amount of €15
15	Receive an amount of €3	Pay an amount of €15

Table 17: Multiple price list of 8-week saving contracts starting at Session 1 (MPL8)

Choice	**Long saving contracts**	
	Session 1 (today)	Session 3 (in 8 weeks)
1	Pay an amount of €15	Receive an amount of €50
2	Pay an amount of €15	Receive an amount of €45
3	Pay an amount of €15	Receive an amount of €40
4	Pay an amount of €15	Receive an amount of €36
5	Pay an amount of €15	Receive an amount of €34
6	Pay an amount of €15	Receive an amount of €32
7	Pay an amount of €15	Receive an amount of €30
8	Pay an amount of €15	Receive an amount of €28
9	Pay an amount of €15	Receive an amount of €26
10	Pay an amount of €15	Receive an amount of €24
11	Pay an amount of €15	Receive an amount of €22
12	Pay an amount of €15	Receive an amount of €20
13	Pay an amount of €15	Receive an amount of €18
14	Pay an amount of €15	Receive an amount of €16
15	Pay an amount of €15	Receive an amount of €14

Table 18: Multiple price list of 8-week debt contracts starting at Session 1 (MPL9)

Choice	**Long debt contracts** Session 1 (today)	Session 3 (in 8 weeks)
1	Receive an amount of €39	Pay an amount of €15
2	Receive an amount of €35	Pay an amount of €15
3	Receive an amount of €31	Pay an amount of €15
4	Receive an amount of €27	Pay an amount of €15
5	Receive an amount of €24	Pay an amount of €15
6	Receive an amount of €21	Pay an amount of €15
7	Receive an amount of €19	Pay an amount of €15
8	Receive an amount of €17	Pay an amount of €15
9	Receive an amount of €16	Pay an amount of €15
10	Receive an amount of €15	Pay an amount of €15
11	Receive an amount of €14	Pay an amount of €15
12	Receive an amount of €13	Pay an amount of €15
13	Receive an amount of €11	Pay an amount of €15
14	Receive an amount of €9	Pay an amount of €15
15	Receive an amount of €7	Pay an amount of €15

Online Appendix

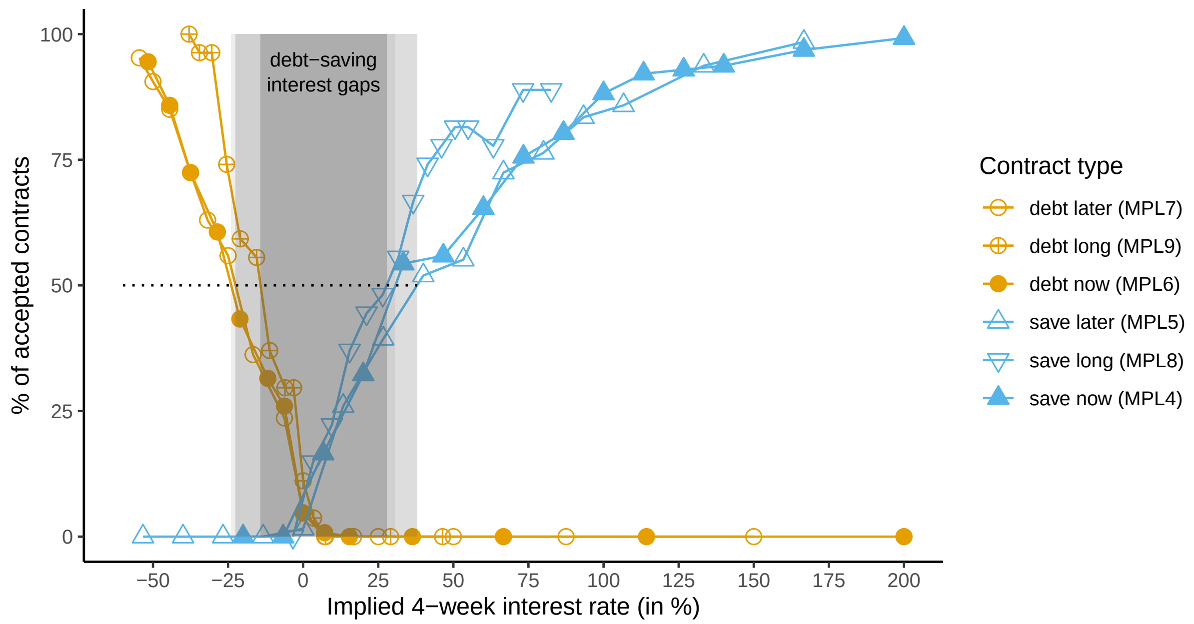
B Individual Characteristics

Table 19: Overview of Elicited Individual Characteristics

Individual Characteristic	Measurement	No. of Items	Source / Reference
Financial Literacy	Global OECD/INFE FinLitSurvey	5	(Atkinson et al., 2016)
	S&P International FinLit Survey	3	(Klapper et al., 2015)
	Debt Literacy	3	(Lusardi and Tufano, 2015)
	FinLit Quiz	4	(Agnew and Harrison, 2015)
Numeracy	Abbreviated Numeracy Scale	6	(Weller et al., 2013)
Cognitive Reflection	CRT	3	(Frederick, 2005)
	CRT-2	4	(Thomson and M. Oppenheimer, 2016)
	CRT-long	3	(Primi et al., 2016)
	Extended CRT	3	(Toplak et al., 2013)
Fluid Intelligence	Raven Progressive Matrices	36	(Raven, 1960)
Personality	BFI-2-S	30	(Soto and John, 2017)
	HEXACO-60 (Honesty)	8	(Ashton and Lee, 2009)
Preferences	Preference Survey Module	12	(Falk et al., 2016)
Planned Behavior	Purchases	7	–
	Financing	7	–

C Additional Graphs

Figure 4: Share of accepted debt and saving contracts by starting dates and duration



Notes: Debt and saving contracts of different starting dates (now and in four weeks) and duration (four and eight weeks) are displayed separately.

D Robustness Checks

In this section we will consider several different structural assumptions pertaining to the cost of being in debt, the utility and discount functions, as well as the decision error process. To keep the appendix size manageable, we will make use of the simple aggregate maximum likelihood specification, outlined in Section 4.1.1

D.1 Alternative Specifications of the Utility Cost of Borrowing

Fixed cost of being indebted:

In our main specification, the cost of being in debt depends on the timing and amount of the required repayment. Instead, debt aversion could also be modeled as a fixed cost, which is incurred at the time of going into debt. Thus, we consider an alternative definition of $c(\boldsymbol{x})$ with γ as fixed cost independent of the size of the loan:

$$c(\boldsymbol{x}) = \gamma\phi(t). \tag{19}$$

Table 20: Aggregate parameter estimates with fixed cost of going into debt

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6421	0.0371	0.4332	1.1064	0.449
95% confidence interval	0.57 / 0.71	0.02 / 0.05	0.25 / 0.61	1.08 / 1.13	0.37 / 0.53
robust standard error	0.0344	0.0063	0.0911	0.0118	0.0402

estimation details: n = 12240, log-likelihood = -4106.98, AIC = 8223.95, BIC = 8261.01, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 127 clusters

For interpretation, $\gamma = 0$ now corresponds to debt neutrality, i.e. no utility cost of borrowing, $\gamma > 0$ corresponds to debt aversion and $\gamma < 0$ to debt affinity. Estimation results are presented in Table 20. Except for γ, parameter estimates remain virtually identical. The new debt aversion parameter is estimated at $\gamma = 0.4332$, implying that the average decision-maker faces positive fixed utility costs when going into debt, i.e. they are debt averse.

Scaling utility of borrowed money: As a second alternative, we consider a utility cost of borrowing that is dependent on the timing and amount of loan receipt. Intuitively, one could think of the decision-maker experiencing less pleasure from money that is actually borrowed compared to money from other sources. The cost of being in debt is thus defined as:

$$c(\boldsymbol{x}) = (1 - \gamma)\phi(t)v(x_t). \tag{20}$$

Interpretation of γ is inverted as compared to the main specification, i.e. $\gamma < 1$ corresponds to debt aversion and $\gamma > 1$ to debt affinity. Estimation results are presented in Table 21. Again, except for γ, parameter estimates remain largely unchanged. The new debt aversion parameter is estimated at $\gamma = 0.9543$, i.e. the average decision-maker remains debt averse.

Assuming debt neutrality: Finally, we consider a model based on our main specification, but abstracting from debt aversion, i.e. assuming $\gamma = 1$. Comparing our main specification to the debt neutral model, allows to scrutinize whether incorporating any form of cost of being indebted increases explanatory power.

Table 21: Aggregate parameter estimates with gamma as scaling factor for utility from loan payments

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6421	0.034	0.9543	1.1111	0.4435
95% confidence interval	0.57 / 0.71	0.02 / 0.05	0.93 / 0.98	1.09 / 1.14	0.37 / 0.52
robust standard error	0.0348	0.006	0.0108	0.0124	0.0399

estimation details: n = 12240, log-likelihood = -4112.31, AIC = 8234.62, BIC = 8271.68, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 127 clusters

Table 22: Aggregate parameter estimates assuming debt neutrality

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	γ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.649	0.0165		1.1342	0.4496
95% confidence interval	0.58 / 0.72	0.01 / 0.02		1.11 / 1.16	0.37 / 0.53
robust standard error	0.0346	0.0034		0.0133	0.0403

estimation details: n = 12240, log-likelihood = -4128.24, AIC = 8264.48, BIC = 8294.13, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 127 clusters

Estimation results are presented in Table 22. Comparing the information criteria AIC and BIC we observe that any model incorporating cost of being in debt is superior to the specification abstracting from debt attitudes, thus corroborating debt attitudes as a distinct domain of individual preferences. This holds irrespective of whether the cost of being in debt is modeled as scaling disutility from repayments (main specification), fixed cost of being indebted, or scaling utility from borrowed money.

D.2 Alternative Utility Specifications

Besides the cost of being in debt, we consider a wide range of alternatives to characteristics of our utility specification in general.

Different present bias for gains and losses: Besides utility curvature and time discounting, allowing for distinct present bias in gains and losses constitutes an appealing robustness check in the context of our experiment. In particular, present bias for payments in the gain domain, i.e. β^+ for $x > 0$ also captures participants' trust in the experimenters' promises to affect payments in the future. Analogously, present bias in the loss domain, i.e. β^- for $x < 0$ captures participants' confidence that they will actually satisfy their own future payment obligations. If participants exhibit either mistrust or a lack of confidence in their own payment reliability, on average debt contracts would appear more and savings contracts less appealing to them. In this situation, our estimate of debt aversion would actually be biased downwards. In this light, we consider different present bias in gains and losses through the discount function:

$$\phi(\tau, x) = \begin{cases} 1 & \text{if } \tau = 0 \\ \frac{1}{1+\beta^+} \frac{1}{(1+\delta)^\tau} & \text{if } \tau \neq 0 \text{ and } x \geq 0 \\ \frac{1}{1+\beta^-} \frac{1}{(1+\delta)^\tau} & \text{if } \tau \neq 0 \text{ and } x < 0. \end{cases} \tag{21}$$

Estimation results are presented in Table 23. We find neither evidence for significant differences between β^+ and β^-, nor that any parameter of present bias is different from zero. Moreover, the debt aversion parameter remains larger than 1, and has a similar magnitude as in our main specification. Summing up, debt aversion persists and is unlikely biased downwards due to mistrust in the experiment or participants' confidence in their payment morale.

Risk neutrality: As utility curvature, determined through α, has a major effect on the size of the remaining preference parameters in our main specification we also consider an adaption abstracting from utility curvature. In particular, we consider the case of risk neutrality with $\alpha = 0$.

Estimation results are presented in Table 24. Debt aversion persists and appears higher than in our main specification allowing for risk aversion. As expected, also the

Table 23: Aggregate parameter estimates allowing with separate present bias in the gain and loss domain

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\beta^+}$ PB gains	$\boldsymbol{\beta^-}$ PB losses	$\boldsymbol{\delta}$ time discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6431	-0.0008	-0.0018	0.0367	1.0537	1.1065	0.4484
95% CI	0.58 / 0.71	-0.01 / 0.01	-0.01 / 0.01	0.02 / 0.05	1.03 / 1.08	1.08 / 1.13	0.37 / 0.53
robust SE	0.0345	0.0062	0.0055	0.0078	0.0144	0.0119	0.0402

estimation details: n = 12240, log-likelihood = -4107.84, AIC = 8229.69, BIC = 8281.57, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 127 clusters

Table 24: Aggregate parameter estimates assuming risk neutrality

	α risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate		0.1018	1.154	1.3533	3.0901
95% confidence interval		0.07 / 0.14	1.09 / 1.22	1.3 / 1.41	2.8 / 3.38
robust standard error		0.0175	0.033	0.0269	0.1468

estimation details: n = 12240, log-likelihood = -4813.36, AIC = 9634.73, BIC = 9664.38, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 127 clusters

remaining parameter estimates change substantially, which makes intuitive sense due to the different shape of the atemporal utility function $u(x)$ when assuming $\alpha = 0$.

CARA utility: Our main specification assumes atemporal utility to be characterized by constant relative risk aversion (CRRA). We examine the robustness of our findings by additionally considering exponential utility characterized by constant absolute risk aversion (CARA):

$$u(x) = \frac{1 - e^{-\varphi x}}{\varphi} \tag{22}$$

Here, φ is the parameter of absolute risk aversion. Estimation results are presented in Table 25. Again as in the previous robustness check, this adaption leads to a substantial change in the shape of the atemporal utility function $u(x)$. As a consequence, also parameter estimates beyond φ change considerably. Debt aversion, however, persists.

Table 25: Aggregate parameter estimates with CARA utility

	φ risk aversion	δ discounting	γ debt aversion	λ loss aversion	μ Fechner error
point estimate	0.0112	0.0898	1.1358	1.3055	2.4346
95% confidence interval	<.01 / 0.02	0.06 / 0.12	1.08 / 1.19	1.26 / 1.35	2.08 / 2.79
robust standard error	0.0042	0.0141	0.027	0.0252	0.1805
estimation details: n = 12240, log-likelihood = -4182.05, AIC = 8374.1, BIC = 8411.16, logit Fechner error					

Robust standard errors (SE) clustered at the individual level, 127 clusters

Table 26: Aggregate parameter estimates estimated without ε-transformation

	α risk aversion	δ discounting	γ debt aversion	λ loss aversion	μ Fechner error
point estimate	0.6429	0.0355	1.0528	1.106	0.4487
95% confidence interval	0.58 / 0.71	0.02 / 0.05	1.03 / 1.07	1.08 / 1.13	0.37 / 0.53
robust standard error	0.0344	0.006	0.0111	0.0121	0.0402
estimation details: n = 12240, log-likelihood = -4108, AIC = 8226, BIC = 8263.06, logit Fechner error					

Robust standard errors (SE) clustered at the individual level, 127 clusters

No ε-transformation: Lastly, in our main specification we consider CRRA utility including an ε-transformation, because of its beneficial properties for estimation. As a final alteration of the utility specification, we consider a robustness check without the ε-transformation, i.e. atemporal utility takes the form:

$$u(x) = \frac{x^{1-\alpha}}{1-\alpha} \tag{23}$$

Estimation results are presented in Table 26. Parameter estimates remain largely unchanged compared to the main specification. Debt aversion remains robust.

D.3 Alternative Error Structures

In line with Drichoutis and Lusk (2014), we acknowledge that parameter estimates may depend on assumptions about the decision error process. Therefore, we employ three alternative error structures as robustness checks.

Table 27: Aggregate parameter estimates with probit instead Fechner error

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6411	0.0373	1.0559	1.1099	0.7963
95% confidence interval	0.58 / 0.71	0.03 / 0.05	1.03 / 1.08	1.09 / 1.13	0.66 / 0.93
robust standard error	0.0327	0.0063	0.0118	0.0117	0.0671

estimation details: n = 12240, log-likelihood = -4109.29, AIC = 8228.58, BIC = 8265.65, **probit Fechner error**

Robust standard errors (SE) clustered at the individual level, 127 clusters

Probit-link Fechner error: First, we consider a Fechner error with probit link instead of logit link as in our main specification. Technically, $F(\xi)$ is no longer a standard logistic distribution function but the standard normal distribution function, i.e $F(\xi) = \Phi(\xi)$, where Φ represents the standard normal CDF. Estimation results are presented in Table 27. Parameter estimates, except for the Fechner error term, remain largely unchanged compared to the main specification. Debt aversion is robust.

Additional Tremble error: Second, we introduce a second type of error aside from the logit Fechner error of our main specification. In particular, we consider that decision-makers may make a tremble error, i.e. randomize choice between both options with some probability $|\kappa|$ as e.g. in Andersson et al. (2020). Consequently, the probability of observing choice B is given by:

$$P^B(\theta') = (1-|\kappa|)F\left(\frac{U(X^B,p)-U(X^A,p)}{\mu}\right) + \frac{|\kappa|}{2} = (1-|\kappa|)F(\Delta U(\theta)) + \frac{|\kappa|}{2}, \quad (24)$$

where $\theta' = (\alpha, \delta, \gamma, \lambda, \mu, \kappa)$. The corresponding log-likelihood function writes as:

$$ln\ L(\theta') = \sum_i \sum_j \left[ln\left(P^B(\theta')\right)c_{ij} + ln\left(1-P^B(\theta')\right)(1-c_{ij})\right] \quad (25)$$

Intuitively, the error parameter can be interpreted as follows: for $|\kappa| \to 0$ the tremble error has no effect on choices, while for $|\kappa| \to 1$ choices approach uniform randomization.

Estimation results are presented in Table 28. The estimated tremble error probability $|\kappa|$ is statistically indistinguishable from 0, and the remaining parameter estimates are

Table 28: Aggregate parameter estimates with tremble and logit Fechner error

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error	$\boldsymbol{\kappa}$ tremble error
point estimate	0.643	0.036	1.0535	1.1074	0.4484	−0.000·
95% CI	0.58 / 0.71	0.02 / 0.05	1.03 / 1.08	1.08 / 1.13	0.37 / 0.53	−0.0· / 0.0·
robust SE	0.0345	0.006	0.0112	0.0118	0.0402	0.000·

estimation details: n = 12240, log-likelihood = -4107.91, AIC = 8225.81, BIC = 8262.88, **logit FE + tremble error**
−0.0· (resp. 0.0·) is between 0 and −0.01 resp. (0.01); −0.000· (resp. 0.000·) is between 0 and −0.0001 resp. (0.0001)

Robust standard errors (SE) clustered at the individual level, 127 clusters

virtually unchanged compared to the main specification. Debt aversion also persists when considering an additional tremble error.

Multiple Fechner errors: Third, we consider a specification with distinct Fechner error terms for all domains, as represented through our set of seven different MPLs. Accordingly, we end up with seven Fechner error terms μ_1, ..., μ_7 for MPL1 to MPL7, respectively. Estimation results are presented in Appendix Table 29. While we observe significant variation in the Fechner errors across some MPLs, the remaining parameter estimates are virtually unchanged compared to the main specification. Debt aversion persists.

D.4 Sample Variations

Finally, we check whether the composition of the sample used to estimate preference parameters does have an effect on the estimation. To this end, we scrutinize two variations.

Drop-outs: First, we take into account, that participants who completed the entire experimental sequence of three sessions might be systematically different from those who dropped out along the way. Estimation results presented in Table 30, are based on all observations including participants who dropped out prematurely. Parameter estimates do change to some degree compared to estimated parameters of the main modeling specification based on the more restrictive sample of people who completed the entire experimental sequence. However, debt aversion also characterizes this extended population.

Trust and confidence: Second, we consider a sample variation along the dimensions of trust and confidence of participants. As outlined earlier, if participants exhibit either

Table 29: Aggregate parameter estimates with multiple Fechner errors

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion		$\boldsymbol{\mu_1}$ FE MPL1
point estimate	0.6553	0.0326	1.0442	1.1029		0.2169
95% CI	0.58 / 0.73	0.02 / 0.04	1.03 / 1.06	1.08 / 1.13		0.15 / 0.28
robust SE	0.0379	0.0054	0.0097	0.014		0.0339
	$\boldsymbol{\mu_2}$ FE MPL2	$\boldsymbol{\mu_3}$ FE MPL3	$\boldsymbol{\mu_4}$ FE MPL4	$\boldsymbol{\mu_5}$ FE MPL5	$\boldsymbol{\mu_6}$ FE MPL6	$\boldsymbol{\mu_7}$ FE MPL7
point estimate	0.4142	0.5186	0.3886	0.3905	0.48	0.4404
95% CI	0.33 / 0.5	0.42 / 0.61	0.29 / 0.48	0.3 / 0.49	0.35 / 0.61	0.33 / 0.55
robust SE	0.0433	0.0478	0.0485	0.0485	0.065	0.0564

estimation details: n = 11430, ln-likelihood = -3676.81, AIC = 7375.62, BIC = 7456.41, **distinct errors per MPL**

Robust standard errors (SE) clustered at the individual level, 127 clusters

mistrust in the payment reliability of the experimenter, or a lack of confidence in their own payment reliability, on average debt contracts would appear more and savings contracts less appealing to them. In this situation, our estimate of debt aversion would be biased downwards. To investigate this possibility, we make use of participants' self-reported ratings on two questions presented at the very end of the experimental sequence at Session 3: *"Back then* [in the first session when you made all financial decisions]*, 1. how sure have you been that the experimenters will make the promised payments in the future in case such a decision has been chosen as the decision that counts? 2. how sure have you been that you will make the promised payments in the future in case such a decision has been chosen as the decision that counts?"* To derive parameter estimates unperturbed by sub-optimal trust or confidence, we consider a sample excluding all people who did not answer in the most positive way *"very sure"*.

Estimation results are presented in Table 31. Albeit our very strict exclusion criteria affects around 50% of participants, parameter estimates remain similar to those of the main specification estimated on the entire sample. Debt aversion persists.

Table 30: Aggregate parameter estimates including drop-outs

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6624	0.0311	1.0499	1.1056	0.4356
95% confidence interval	0.6 / 0.72	0.02 / 0.04	1.03 / 1.07	1.08 / 1.13	0.37 / 0.51
robust standard error	0.0311	0.0054	0.0099	0.0109	0.0357

estimation details: n = 14310, log-likelihood = -4848.86, AIC = 9707.72, BIC = 9745.56, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 148 clusters

Table 31: Aggregate parameter estimates including only participants who perfectly trust the experiment

	$\boldsymbol{\alpha}$ risk aversion	$\boldsymbol{\delta}$ discounting	$\boldsymbol{\gamma}$ debt aversion	$\boldsymbol{\lambda}$ loss aversion	$\boldsymbol{\mu}$ Fechner error
point estimate	0.6248	0.0379	1.0575	1.0943	0.444
95% confidence interval	0.54 / 0.71	0.02 / 0.06	1.02 / 1.09	1.06 / 1.12	0.34 / 0.55
robust standard error	0.0436	0.0101	0.0178	0.015	0.0544

estimation details: n = 5700, log-likelihood = -1837.52, AIC = 3685.05, BIC = 3718.29, logit Fechner error

Robust standard errors (SE) clustered at the individual level, 60 clusters

E Experimental Instructions

Upon first arrival at the lab, detailed instructions regarding the experiment as a whole and Session 1, in particular, were given as a printed handout. Identical instructions were displayed on the screen throughout the course of the experiment. Task-specific instructions were displayed on the screen sequentially before the respective tasks in all sessions. After reading the instructions, participants completed the tasks and then received instructions for the following task. Participants were given time to carefully read the instructions and ask questions.

The study design as delineated in the main paper section Experiment and in the instructions was approved by the Ethics Review Committee of Maastricht University (Reference Number: ERCIC_138_07_05_2019).

E.1 Instructions at the beginning of Session 1 (on screen + printout to reread)

E.1.1 Overview

As announced in the invitation email, this is a three-part experiment. Today is the first part of the experiment (Session 1). The second part (Session 2) will take place in exactly four weeks from now (*Day, Date*, at the same starting time as today). The third part (Session 3) will take place in exactly eight weeks from now (*Day, Date*, at the same starting time as today). The experiment today will last 90 minutes, Session 2 and Session 3 will last 30 minutes respectively. To participate in today's experiment, you have to be able to participate in all sessions. If you cannot participate at one of these dates, please raise your hand now.

The following will happen during the three sessions:

E.1.2 Session 1 (today)

Today you will make a total of 90 *(120 in extension)* financial decisions, involving real money. The choices are simple and not meant to test you - the only correct answers are the ones you really think are best for you.

In the financial decisions you either have the choice between two options (Option A and Option B), or you have the choice of accepting or not accepting a savings or debt contract.

Generally, the financial decisions specify amounts of money that you will receive at different dates with different probabilities, or that you have to pay to the experimenter at different dates. The timing of the payments corresponds to the timing of the sessions. For instance, a financial decision may look as follows:

Option A	**Option B**	**Your choice**
Receive €18 today	Receive €20 in 4 weeks	❒ Option A ❒ Option B

In this case, you have the choice between receiving €18 today (i.e. at the end of today's session) or in four weeks, at the end of Session 2. A financial decision may also only involve future dates:

Option A	**Option B**	**Your choice**
Receive €18 in 4 weeks	Receive €20 in 8 weeks	❐ Option A ❐ Option B

In this case you choose between monetary amounts to be paid either in four weeks, at the end of Session 2 (Option A), or in eight weeks, at the end of Session 3 (Option B).

At the end of today's session, you will be asked to fill out a short questionnaire. Afterwards, one of the 90 *(120 in extension)* decision situations will be drawn randomly as the 'decision that counts'. Your choice in that decision situation will then actually be implemented, and you will receive or pay the specified monetary amounts depending on your actual decision. Each decision situation has the same chance to be selected as the 'decision that counts'. It is therefore in your interest to consider all decision situations with equal care.

E.1.3 Session 2 (In four weeks)

In four weeks, we will ask you to complete a questionnaire. Additionally, all monetary payments that are due at Session 2 will be implemented. Please note that because of the questionnaire you will have to show up at this date, even if you will not receive or pay any monetary amounts at this date.

E.1.4 Session 3 (In eight weeks)

In eight weeks, we will ask you to complete a questionnaire. Additionally, all monetary payments that are due at Session 3 will be implemented. Please note that because of the questionnaire you will have to show up at this date, even if you will not receive or pay any monetary amounts at this date.

E.1.5 Your Payment

The selection of the 'decision that counts' will be made randomly and individually for each participant at the end of today's session. This selection will be made with the help of a bingo cage with 90 *(120 in extension)* numbered balls. All decision situations are numbered, and the number drawn by the bingo cage will be the 'decision that counts'. This decision will then actually be implemented, and you will receive or pay monetary amounts, as specified in the 'decision that counts'.

At the beginning of today's session, you already received a show-up fee of €15 for all three sessions in cash. On top of that money you will receive the money earned from your decisions. Additionally, you will receive a completion bonus of €20 after Session 3, provided you have shown up on time at each session, and have made all payments as agreed (more on this later). This completion bonus will be transferred to your bank account around one week after Session 3. For this payment, we will ask you for your bank details at the end of Session 3.

Please note, should you, arising through your own fault, fail to attend all sessions or fail to make any payments agreed upon you will be excluded from the remaining experiment and all payments associated with it. You will also be removed from the BEElab participant pool and thus not receive any further invitations for economic experiments.

E.2 Instructions throughout Session 1 (on screen before respective task + printout to reread)

E.2.1 Let's go

The 90 *(120 in extension)* decision situations are separated into four parts. You will now receive the specific instructions for part 1.

E.2.2 Part1

In this part, you will make a total of 10 decisions. In each decision, you can choose between receiving monetary amounts today, or in one month, at Session 2. For instance, one of these decisions could look like this:

Option A	**Option B**	**Your choice**	
Receive €18 today	Receive €20 in 4 weeks	❐ Option A	❐ Option B

If you choose Option A in this decision situation, you will receive €18 today. If you choose Option B, you will receive €20 in four weeks, at Session 2.

If you prefer to receive €18 today and nothing in four weeks, choose Option A.

If you prefer to receive €20 in four weeks and nothing today, choose Option B.

Please note that we guarantee the later payment, even if you cannot participate on the due date for any unforeseen reason. In that case, we will transfer the money to your bank account, or you can pick it up at the secretarial office of the department of economics (MPE) at the School of Business and Economics. At the end of today's session, you will receive a receipt containing the email address of the principal investigator, who you can contact should there be any issues with the payment process.

Subsequently, participants made the 10 decisions of MPL1 (Appendix Table 10).

E.2.3 Part 2

In the following part, you will make a total of 20 choices. All payments occur today but depend on the outcome of a coin flip. If a decision situation from this part has been randomly selected as the 'decision that counts', you will make this coin flip yourself after the experiment today. The coin is fair. There is an equal chance of observing HEADS or TAILS.

For example, you might be asked to choose between the following options:

Option A		**Option B**		**Your choice**	
Coin shows HEADS	Coin shows TAILS	Coin shows HEADS	Coin shows TAILS		
€5	€4	€10	€1	❒ Option A	❒ Option B

In this decision situation, if you choose Option A and the coin shows HEADS, you win €5; if the coin shows TAILS, you win €4. If you choose Option B and the coin shows HEADS, you win €10; if the coin shows TAILS, you win €1.

In some decision situations, one option will be a safe amount and in the other option, the amount depends on a coin flip. For instance, such a decision situation may look as follows:

Option A	**Option B**		**Your choice**	
safe	Coin shows HEADS	Coin shows TAILS		
€5	€10	€1	❒ Option A	❒ Option B

In this decision situation, if you choose Option A you receive €5 for sure.

If you choose Option B and the coin shows HEADS, you win €10; if the coin shows TAILS, you win €1.

Subsequently, participants made the 20 decisions of MPL2 and MPL3 (Appendix Tables 11 and 12).

E.2.4 Part 3

In the following part, you will make a total of 30 *(45 in extension)* choices. This time, you will be offered a series of real savings contracts, that you can either accept or not accept. Savings contracts involve the payment of some monetary amount by you to the experimenter at an earlier date and the repayment of a monetary amount to you at a later date.

For example, consider the following contract:

Savings Contract		**Your choice**	
Pay €10 today	Receive €12 in 4 weeks	❒ Accept	❒ Not Accept

Under such a contract, you pay the experimenter €10 today, and receive €12 in four weeks, at Session 2. Note that if you have accepted one of these contracts and in case it has been selected as the 'decision that counts', you may use your show-up fee of €15, to pay this amount today.

Please note that we guarantee the later payment, even if you cannot participate on the due date for any unforeseen reason. In that case, we will transfer the money to your bank account, or you can pick it up at the secretarial office of the department of economics (MPE) at the School of Business and Economics.

Some savings contracts are defined over dates in the future. This is an example of such a savings contract:

Savings Contract		**Your choice**	
Pay €10 in 4 weeks	Receive €15 in 8 weeks	❒ Accept	❒ Not Accept

Under such a contract, you pay the experimenter €10 in four weeks, at Session 2; and receive €12 in eight weeks, at Session 3. Note that if you have accepted one of these contracts and in case it has been selected as the 'decision that counts', you need to bring the specified amount in cash at Session 2. In any case, you will receive a receipt today, specifying what payments you agreed to make at what session. Additionally, we will send a reminder email before the session at which your payment is due, specifying the amount you need to bring to the session.

The receipt you get also contains the email address of the principal investigator, who you can contact should there be any issues with the payment process.

Should you fail to pay the specified amount at the specified Session, you will be excluded from the experiment, and will not receive any further payments, including the completion bonus payment of €20.

Note that you always have the choice to not accept a savings contract! If you do not accept, you won't pay any money at the earlier date, and won't receive any money at the later date.

Subsequently, participants made the 30 (45 in extension) decisions of MPL4 and MPL5 (and MPL8 in extension) (Appendix Tables 13, 14 and 17).

E.2.5 Part 4

In the following task, you will make a total of 30 *(45 in extension)* choices. This time, you will be offered a series of real debt contracts, that you can either accept or not accept. Debt contracts involve the payment of some monetary amount by the experimenter to you at an earlier date and the repayment of a monetary amount by you to the experimenter at a later date.

For example, consider the following contract:

Debt Contract		**Your choice**	
Receive €10 today	Pay €12 in 4 weeks	❒ Accept	❒ Not Accept

Under such a contract, the experimenter pays you €10 today, and you have to pay back €12 to the experimenter in four weeks, at Session 2. Note that similar to the Saving Contracts, some debt contracts are defined over dates in the future. Here is an example of such a debt contract:

Debt Contract		**Your choice**	
Receive €10 in 4 weeks	Pay €12 in 8 weeks	❒ Accept	❒ Not Accept

Under such a contract, the experimenter pays you €10 in four weeks, at Session 2; and you have to pay back €12 to the experimenter in eight weeks, at Session 3.
Please note that should you accept a debt contract, we expect you to repay your debt in full, even if you cannot participate on the due date for any unforeseen reason. If you have accepted one of these contracts and in case it has been selected as the 'decision that counts', you need to bring the specified amount in cash at the respective session.[17] In any case, you will receive a receipt today, specifying what payments you agreed to make at what session. Additionally, we will send a reminder email before the session at which your payment is due, specifying the amount you need to bring to the session.

Should you fail to pay the specified amount at the specified session, you will be excluded from the experiment, and will not receive any further payments, including the completion bonus payment of €20.

Note that you always have the choice to not accept a debt contract! If you do not accept, you won't receive any money at the earlier date, and won't have to pay back any money at the later date.

Subsequently, participants made the 30 (45 in extension) decisions of MPL6 and MPL7 (and MPL9 in extension) (Appendix Tables 15, 16 and 18).

E.2.6 Check-out questionnaire

You completed all decisions. Now you still need to fill out a questionnaire and then you are done with today's session.

[17] Alternatively, you may also pay the specified amount via PayPal to the experimenter at the respective session.

In this part we ask you to answer some questions and rate some statements about yourself. Some of them you need to classify according to how much they resemble yourself, others need to be ranked according to how much you agree with them or you think society agrees with them, accordingly.

Subsequently, participants provided basic sociodemographic information and answered the collection of 54 items on debt behavior and attitudes as described in detail in Albrecht and Meissner (2022).

E.2.7 Random Draw

Please give a sign to the experimenter. The experimenter will then come to you in order to draw the decision that counts from the bingo cage and implement your choice. Afterwards today's payments will be completed and you can leave the lab.

E.3 Instructions at Session 2 (on screen before respective task)

E.3.1 General Intro

Today we ask you to solve some logical tasks and answer a set of questions. Additionally, at the end of the session, all monetary payments that are due today will be implemented.

E.3.2 CRT and Numeracy

You will start by solving 19 logical tasks, afterwards, there will be a questionnaire. Before you start with the logical tasks you will see an example on the next screen.

In each task there will be a short text explaining an issue. Underneath you will find a box where you can type your answer. The answer may be in form of a number or text depending on the task. When appropriate the answer's unit of measurement is already given.

Note, once you typed your answer and hit the continue button you will proceed to the next task and not be able to return.

Subsequently, participants completed tasks on numeracy and cognitive reflection (see B).

E.3.3 BFI

You finished all logical tasks. In the next section, we ask you to answer some questions about yourself.

All questions have the same structure: "I am someone who ..." followed by something like "is outgoing and sociable." and need to be rated according to your level of agreement.

Subsequently, participants completed 30 items of the Big Five Inventory-2-S (see Appendix B).

E.3.4 Preference Module

There is one more section with questions about yourself to go.

Subsequently, participants completed 12 items of the Preference Survey Module (see Appendix B).

E.4 Instructions at Session 3 (on-screen before respective task)

E.4.1 General Intro

Today we ask you to solve some logical tasks and to answer a set of questions. Additionally, at the end of the session, all monetary payments that are due today will be implemented.

E.4.2 Raven

You will start by solving 36 logical tasks, afterwards, there will be a questionnaire. Before you start with the logical tasks you will see an example on the next screen.

In each task there will be a picture on the left side of the screen. In the upper half of the picture, you may see a puzzle with different pieces. Most pieces are shown while the space for the last piece is left blank. You need to choose from the suggestions in the lower half, which piece fits the blank in the puzzle best.

Note, once you typed your answer and hit the continue button you will proceed to the next task and not be able to return.

Subsequently, participants completed 36 Raven matrices (see Appendix B).

E.4.3 Planned Behavior

In the next section, we ask you to answer some questions about the likelihood that you will make certain purchases in the future and how you will finance them.

Subsequently, participants completed seven items on their likelihood to purchase certain things within the one year and the likelihood to loan-finance these purchases (see Appendix B).

E.4.4 Financial Literacy

In the next section, we ask you to answer 16 financial questions.

Please note, for your convenience, you may use the Windows built-in calculator. To start the calculator use the calculator button in the bottom right-hand corner of the screen. If you want to, you can try that now. Please note, you can also set the calculator to the scientific mode in case you want to do calculations involving exponents or the like.

Subsequently, participants completed 36 financial literacy items (see Appendix B).

E.4.5 Hypothetical Debt Contracts

There is one more section to go. You will be asked how you would behave in a series of four different hypothetical situations.

Imagine your bank offered you a debt contract. Under this contract, you receive €100 from your bank today and have to pay back some amount in 6 months.

Please assume that in all these choices you must pay the full amount you owe to the bank on time.

Subsequently, participants completed the four-item staircase measure (see Albrecht and Meissner (2022) for details).

E.4.6 Additional Questions on Honesty and Trustworthiness of Experimental Environment

In the next section, we ask you to answer some questions about yourself and how you think about certain things.

Subsequently, answered eight items from the HEXACO-60 Inventory in the honesty domain (see Appendix B) and four further questions on the trustworthiness of the experimental environment.

F Contract Form

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Maastricht
January 2020

Dear

based on today's experimental session you agree and confirm the following contractual details.

1. *Receival of a show up fee of 15 € today.*

2. *Receival of € decision-based payoff today.*
3. *Receival of € decision-based payoff in four weeks on (, . .2020).*
4. *Receival of € decision-based payoff in eight weeks on (, . .2020).*

5. *Receival of 20 € completion bonus after Session 3, conditional on showing up at each session and making all payments as agreed.*

6. *Payment of € decision-based payment today.*
7. *Payment of € decision-based payment in four weeks on (, . .2020).*
8. *Payment of € decision-based payment in eight weeks on (, . .2020).*

For the payment of the completion bonus we will ask you for your bank details after Session 3.

Please also leave your mail address, so that we can send a reminder for future due payments.

Mail:

Date, Signature:

AACSB ACCREDITED
EFMD EQUIS ACCREDITED
ASSOCIATION OF MBAS ACCREDITED

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