

# Preferences, Disposition Effect and COVID-19



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## ABOUT THIS REPORT:

We measure preferences and trading behavior during the emergence of the COVID-19 crisis. Firstly, we elicit and estimate present bias, patience, risk and loss aversion, and probability weighting in a large representative online Dutch household panel with high stakes. Impatience and risk seeking behavior increase during the emergence of the COVID-19 crisis. Secondly, we observe a strong disposition effect, which correlates negatively with stock market returns during the emergence of the COVID-19 crisis. Finally, we empirically test the predictions from realization utility (Barberis and Xiong, 2012), but we find little support. Actually, we find the reverse: the probability that an investor sells a stock within a year is a decreasing function of his impatience and of the stock's volatility, and an increasing function of loss aversion. Additionally, more patient investors allocate more to stocks with low expected returns and higher volatility.

We measure individual risk and time preferences, and examine the relationship with investment behavior. Firstly, we elicit present bias, discount rates, risk and loss aversion, and probability weighting in a large representative online Dutch household panel using an extended version of the Convex Time Budget method of Andreoni and Sprenger (2012). We analyze how risk and time preferences evolve during the emergence of the COVID-19 crisis. Secondly, we test the disposition effect - the tendency of investors to hold losing investments too long and sell winning investments too early by a simple experiment (Ploner, 2017) based on realization utility from Barberis and Xiong (2012). Finally, we investigate how individual trading behavior develops during the COVID-19 crisis and whether it behaves in line with the structurally estimated preferences and the theoretical predictions from realization utility.

Our first results (on preferences) show that CRRA risk aversion decreased during the emergence of the COVID-19 crisis and subjects also become more impatient, while loss aversion, present bias and probability weighting appear more stable. In addition, we find that preferences are more precisely estimated when including probability weighting in the preference specification. Our second results (on investment behavior) show a strong disposition effect and the disposition effect correlates negatively with stock market returns during the emergence of the COVID-19 crisis. Moreover, we find almost no support for the predictions from realization utility: the probability that the investor sells a stock within a year is a decreasing function of his impatience and of the stock's volatility, and an increasing function of loss aversion. The more striking hypothesis of realization utility is not supported by our experiment: we find that more patient investors allocate more to stocks with low expected returns and higher volatility.

Our contribution is two-fold. Firstly, we analyze the stability of risk and time preferences during the emergence of the COVID-19 crisis (i.e. a rare disaster). Secondly, to the extent of our knowledge, we are the first to empirically relate patience and loss aversion to the disposition effect and, therefore, we are able to directly test the realization utility model from Barberis and Xiong (2012, JFE). Understanding the disposition effect creates a deeper understanding of equilibrium stock market prices.

# Preferences, Disposition Effect and COVID-19\*

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## Abstract

We measure preferences and trading behavior during the emergence of the COVID-19 crisis. Firstly, we elicit and estimate present bias, patience, risk and loss aversion, and probability weighting in a large representative online Dutch household panel with high stakes. Impatience and risk seeking behavior increase during the emergence of the COVID-19 crisis. Secondly, we observe a strong disposition effect, which correlates negatively with stock market returns during the emergence of the COVID-19 crisis. Finally, we empirically test the predictions from realization utility (Barberis and Xiong, 2012), but we find little support. Actually, we find the reverse: the probability that an investor sells a stock within a year is a decreasing function of his impatience and of the stock's volatility, and an increasing function of loss aversion. Additionally, more patient investors allocate more to stocks with low expected returns and higher volatility.

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We measure individual risk and time preferences, and examine the relationship with investment behavior. Firstly, we elicit present bias, discount rates, risk and loss aversion, and probability weighting in a large representative online Dutch household panel using an extended version of the Convex Time Budget method of Andreoni and Sprenger (2012). We analyze how risk and time preferences evolve during the emergence of the COVID-19 crisis. Secondly, we test the disposition effect – the tendency of investors to hold losing investments too long and sell winning investments too early – by a simple experiment (Ploner, 2017) based on realization utility from Barberis and Xiong (2012). Finally, we investigate how individual trading behavior develops during the COVID-19 crisis and whether it behaves in line with the structurally estimated preferences and the theoretical predictions from realization utility.

Our first results (on preferences) show that CRRA risk aversion decreased during the emergence of the COVID-19 crisis and subjects also become more impatient, while loss aversion, present bias and probability weighting appear more stable. In addition, we find that preferences are more precisely estimated when including probability weighting in the preference specification. Our second results (on investment behavior) show a strong disposition effect and the disposition effect correlates negatively with stock market returns during the emergence of the COVID-19 crisis. Moreover, we find almost no support for the predictions from realization utility: the probability that the investor sells a stock within a year is a decreasing function of his impatience and of the stock’s volatility, and an increasing function of loss aversion. The more striking hypothesis of realization utility is not supported by our experiment: we find that more patient investors allocate more to stocks with low expected returns and higher volatility.

Our contribution is twofold. Firstly, we analyze the stability of risk and time preferences during the emergence of the COVID-19 crisis (i.e. a rare disaster). Secondly, to the extent

of our knowledge, we are the first to empirically relate patience and loss aversion to the disposition effect and, therefore, we are able to directly test the realization utility model from Barberis and Xiong (2012, JFE). Understanding the disposition effect creates a deeper understanding of equilibrium stock market prices.

## **I. COVID-19 in The Netherlands**

We implement an experiment on a representative sample in The Netherlands (coincidentally) during the COVID-19 crisis on risk and time preferences, in combination with an experiment for stock trading behavior and attitudes towards pension decisions. The experiments were conducted simultaneously between the turbulent period of March 1 and April 1, the peak period of global stock market crashes and severe lockdown measures in The Netherlands. On March 1 The Netherlands had 10 confirmed cases, 0 deaths and no measures, while April 1 The Netherlands had 13.614 contaminations, 1.173 deaths and a so-called intelligent lockdown.

Brief summary and timeline of events is below. Note that strict lockdown measures have been taken until March 23.

- March 6: National Institute for Public Health and Environmental Protection advises inhabitants of the South to work and stay at home.
- March 9: Prime minister gives a conference and the South must work at home the next 7 days and no hand shaking.
- March 12: Conference by prime minister: all measures in the South are extended to all of The Netherlands. Stay home in case of symptoms, work at home and all events with

more than 100 participants are canceled till April 1 (museums, schools, sport clubs advised to close and only give online support).

- March 15: Conference by prime minister: all schools, bars and restaurants close within 20 minutes. Later that day the prime minister gives a speech for the Dutch population, which is the first time since 1973.
- March 20: Speech by the King.
- March 23: Last conference by prime minister with strict new measures till June 1: groups of max. 3 persons, keep 1.5m distance and all events remain canceled till June 1. Fines up to €400 if rules are broken.

All our survey data are taken from the LISS panel (Longitudinal Internet Study in the Social Sciences), gathered by CentERdata. This panel is recruited through address based sampling (no self-selection), and households without a computer and/or internet connection receive an internet connection and computer free of charge. This representative household panel receives online questionnaires each month, on different topics. When respondents complete a questionnaire, they receive a monthly incentive. The data can be linked to personal characteristics, and to income and wealth data from the tax office and pension funds.

## II. Preferences

We elicit and estimate loss aversion, risk aversion, time discounting (including present bias) and probability weighting for a representative sample of The Netherlands. We find that

subjects become more impatient and more risk seeking during the emergence of the COVID-19 crisis.

## A. Experimental design

During the emergence of the COVID-19 crisis in The Netherlands, we measure preferences among a representative sample of Dutch individuals. The sample period runs from 2 March 2020 to 31 March 2020. We use quantitative and qualitative tasks to measure preferences. We use large monetary amounts, up to €10,000, in the experiments. We first describe the quantitative tasks and, then, the qualitative tasks.

To measure loss aversion we use a simple lottery task from Fehr and Goette (2007) and Gächter et al. (2010). We exclude participants that made non-monotonic choices.

To measure present bias, we use a question from the INTRA (International Test of Risk Attitudes) study, conducted by the University of Zurich. This task is an adapted version from the question in Frederick (2005), and also used by Wang et al. (2016).

*Enter an amount  $c_1$  such that option B is as attractive as option A:*

A. Receive €10,000 now,

B. Receive €  $c_1$  over 1 year.

*Enter an amount  $c_2$  such that option B is as attractive as option A:*

A. Receive €10,000 now,

B. Receive €  $c_2$  over 5 years.

We exclude participants if  $c_1 > c_2$  or  $c_1 < 10,000$ .

We simultaneously measure CRRA curvature, annual discounting and probability weighting with the Convex Time Budgets method of Andreoni and Sprenger (2012).<sup>1</sup> We exclude

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<sup>1</sup>37.79% of the responses are at corners, and only 9.32% of the subjects made zero interior allocations.

participants that allocate the same amount of wealth in each scenario.

We use an additional method to measure risk preferences quantitatively. We measure classical CRRA risk aversion by the task from Eckel and Grossman (2008).

We use 2 qualitative tasks to measure time preferences and 1 qualitative task to measure risk preferences. Additionally, we ask the subjects about their trust in insurance companies and their preferences for an insurance product. Specifically, we ask whether the subject prefers an annuity with low but certain payments, or an annuity with higher but more variable payments.

Table 1 shows some summary statistics of the individuals in our experiments. The sample is representative for the Dutch population. The median number of members in a household is 2. On average, households have one child (0 at the median) that live with their parents. 73% has a partner (either married or not). The median education level is secondary vocational education. Individual after-tax monthly income is €1,800 at the median. It took subjects 15 minutes to complete the survey.

## **B. Results**

### **Aggregated behavior**

Table 2 shows the estimates for the loss aversion task, present bias task and CTB task. On average, subjects are loss averse. Gächter et al. (2010) find similar values for the loss aversion parameter.

The present bias task shows that the present-bias factor  $\beta$  is close to 1 and indicates absence of present bias. A potential reason might be the large amount of (hypothetical)

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Andreoni and Sprenger (2012) find roughly 70 percent of responses at corners, and 36 of 97 subjects made zero interior allocations.

money in the question.

The CTB estimates show a very plausible discount factor, which implies annual discount rates up to 8%. The CRRA risk aversion parameter  $\gamma$  shows that subjects are risk averse. The value is in line with Eckel and Grossman (2008). Interestingly, as shown in Figure 1, the Eckel & Grossman risk aversion task finds higher risk aversion levels. The probability weighting parameter  $\eta$  is larger than 1 and, therefore, shows that participants underweight probabilities.<sup>2</sup> Remark that the estimates *without* a correction for probability weighting (the last four rows in Table 2) are less precisely estimated. So, correcting for probability weighting leads to more precise estimates (i.e., lower standard deviation).

Figure 2 shows the choice behavior in the CTB task. Subjects appear to understand the CTB questions. The fraction of the budget  $m = e10,000$  allocated to the early payment is decreasing in the gross interest rate  $1+r$ , but increasing in the future probability of payment  $p$  and increasing in the time delay  $k$ . Our estimates reflect this choice behavior.

Figure 3 shows the distribution of the estimated parameters in the CTB task.

Figure 4 shows the distribution of responses to the qualitative task. Subjects display heterogeneity in the risk/loss aversion task, but tend to be risk/loss averse. Moreover, subjects are not impulsive and act patient.

Figure 5 presents the trust in insurance companies, and shows that many participants prefer a stable, but lower, flat annuity product rather than the flexible product.

Bivariate correlations between preferences and personal characteristics show the following. Subjects with a partner are more impatient ( $p < 0.03$ , Mann-Whitney rank test). The correlation between the annual discount *rate* and salary is -0.05 ( $p - value < 0.04$ ), such that a higher salary corresponds with more patient behavior. Risk aversion correlates nega-

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<sup>2</sup>We use a simple Prelec weighting function:  $\pi(p) = p^\eta$ , where  $p$  is the objective probability and  $\pi$  the subjective (distorted) probability.

tively and statistically significant with partner, members household, number of children and education. Risk aversion correlates positively and statistically significant with male, age and monthly income.

## **Development during COVID-19**

A main contribution of our paper is the analysis of preferences during the emergence of the COVID-19 crisis. We are the first to present an analysis of the development of preferences throughout the emergence of the COVID-19 crisis.

Our first results rely on bivariate correlations between preferences and the day the subject answered the survey question. We first describe the correlations for the quantitative tasks and, then, the qualitative tasks.

We find no significant relationship with the day of the month for loss aversion and for Eckel & Grossman risk aversion. However, the preferences elicited via the CTB method show that subjects become more impatient and risk seeking during the emergence of the COVID-19 crisis. Specifically, the correlation between the day of the month (from 2 March to 31 March) and the discount factor (rate) is -0.06 (0.04) with a  $p - value < 0.01$  ( $p - value < 0.09$ ). During 2 March to 31 March the relation with CRRA risk aversion is insignificant, however the correlation between the day of the month from 2 March to 24 March and CRRA risk aversion is -0.06 with a  $p - value < 0.03$ . March 24 is the day after the day that the prime minister gave a conference announcing strict lockdown measures. Hence, the correlation shows that risk aversion mainly decreases as a reaction to the lockdown measures.

We find that the correlation between the qualitative risk-preference task and day of the month is 0.07 ( $p - value < 0.00$ ), such that subjects become more risk/loss seeking during the emergence of the COVID-19 crisis. Moreover, both qualitative time-preference

tasks (impulsiveness and myopia) have a positive correlation with the day of the month ( $p - value < 0.01$  and  $p - value < 0.07$  for impulsiveness and myopia, respectively), such that subjects become more impatient during the emergence of the COVID-19 crisis. Finally, the trust in insurance companies increases as the COVID-19 crisis develops ( $p - value < 0.04$ ), but there is no significant relation for the preferred type of insurance product.

Our second set of results relies on multivariate analyses between preferences and the emergence of the COVID-19 crisis. Specifically, we regress preferences (as dependent variables) on the day of the month and control for personal characteristics. The controls include gender, age, education, monthly income and an intercept. We use OLS and robust standard errors to control for unobserved heterogeneity. Again, we first describe the correlations for the quantitative tasks and, then, the qualitative tasks.

Table 3 presents the correlations for the preferences from the quantitative tasks. In line with the bivariate analysis, we do not find a relationship for loss aversion and risk aversion (a la Eckel & Grossman) with the day of the month. However, based on the CTB method, we find that the discount factor and risk aversion decrease during the emergence of the COVID-19 crisis, especially during the period that new lockdown measures are being announced (up to March 24). So, subjects become more patient and more risk seeking during the first few weeks of the COVID-19 crisis. One might be concerned that impatient subjects fill in the survey at the end of the month and, therefore, we observe that subjects become impatient during the month, However, most subjects answer the survey during the first few weeks of the month and our subsample of 2 - 24 March shows that the effect of increasing impatience during the month remains.

Table 4 shows the correlations for the preferences based on the qualitative tasks. In line with the results from the CTB method, we find that risk/loss seeking behavior increases

significantly throughout the month. Furthermore, impulsiveness increases significantly and myopia also (but statistically insignificant). Besides, subjects show increasing trust in insurers during the emergence of the COVID-19 crisis.

### **III. Disposition effect**

We investigate the well-known anomaly that paper losses are realized less than paper gains (i.e., the disposition effect) and we empirically test the hypotheses from the realization utility model of Barberis and Xiong (2012). We confirm (strongly) the existence of the disposition effect for a representative sample of The Netherlands, and we find that the disposition effect correlates negatively with returns on the stock market during the emergence of the COVID-19 crisis. Loss aversion and impatience correlate significantly with the disposition effect, but exactly contrary to what Barberis and Xiong (2012) predict.

#### **A. Experimental design**

To assess the existence of a disposition effect, we use a methodology similar to that of Ploner (2017). Subjects in the experiment face 4 choices over simple risky prospects. We compare the decision to take part in a risky investment of those who had experienced a loss and those who had experienced a gain, in a prior risky choice.

All prospects are simple win/loss gambles with the same probability assigned to the win and the loss outcome. The win and loss outcomes differ across the 4 prospects, see Table 5. Prospect 1 has a negative expected value, and prospect 3 and 4 have positive expected values.

Subjects are given an endowment of €10,000 and must choose to invest it in one product.

In prospect 1 the subject chooses between asset A or B, in prospect 2 the subject chooses between asset C or D, and in prospect 3 the subject chooses between asset E or F. The subjects are aware that A, C and E warrants a win if the outcome of a coin toss is heads, and a loss otherwise. The opposite holds for products B, D and F. The two assets are ex-ante identical and perfectly anti-correlated. In prospect 4 the subject chooses to invest in asset X or asset Y. Asset X has a lower expected return and higher standard deviation than asset Y. X and Y warrant a win if the outcome of a coin toss is heads, and a loss otherwise.

After becoming aware of the outcome of the first coin toss, each subject chooses whether she wants to hold on to the investment for 1 year or to sell it immediately. When holding on, a second coin toss is performed next year and earnings are computed as in the first coin toss. When selling, the earnings of the first toss are immediately paid to the subject.

Given this setting, a straightforward measure of the disposition effect is obtained by comparing the fraction of hold choices (*hold rate*) among those winning and those losing after the first coin toss. Under the standard assumptions of utility maximization, the same tendency to hold on to the investment should be observed among those who registered a loss and those who registered a win in the first coin toss.

## **B. Results**

Table 5 shows the hold rates among the investments that registered a loss and a win in the first coin toss, as well as the difference between both. Clearly, the difference is positive and large for all prospects, which shows that the hold rate among losing stocks is higher than among winning stocks. The difference in hold rates is statistically significant according to a non-parametric Wilcoxon signed rank test,  $p$ -value  $< 0.00$ .<sup>3</sup> This is evidence of a disposition

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<sup>3</sup>Because of repeated choices by a subject, the test using the individual averages across prospects.

effect for all prospects. The disposition effect becomes stronger (i.e., larger difference in hold rates) if the stakes become bigger, such as for products (E,F) and (X).

Table 6 shows that the disposition effect is robust to a bunch of controls. The regression confirms that those experiencing a loss are more likely to hold on to the investment than those experiencing a win ( $p$ -value on loss is  $\approx 0.00$ ). Moreover, subjects hold more on to investments with a higher expected value. Furthermore, the model suggests that males are more likely to hold on to an investment.

### **Development during COVID-19**

In this section, we study how the disposition effect develops during the emergence of the COVID-19 crisis. Specifically, we study the relationship with stock market events.

Figure 6 shows the difference in hold rates among losing and winning stocks (the disposition effect) together with the daily returns on the AEX index. In general, we observe that if the returns on the AEX decrease at day  $t$ , then the disposition effect rises in the days after  $t$ . Vice versa, if the AEX returns increase at day  $t$ , then the disposition effect decreases (i.e., the difference in hold rates declines towards zero) in the days after day  $t$ . The only exception is between March 11 and March 13. It appears that news takes time to incorporate, but subjects in our experiment react quite strongly on stock market events as announced in the media. More specifically, the Spearman's rank correlation between the AEX returns at  $t - 1$  (based on the closing price) and the disposition effect at  $t$  equals -0.33 and is statistically significant with a  $p$ -value of 0.08.

## Relation with preferences

We empirically test 4 predictions from the realization utility model of Barberis and Xiong (2012). To the extent of our knowledge, we are the first simultaneously measure preferences and trading behavior such that we can study the hypotheses from realization utility. We fit a generalized linear fixed-effects (GLFE) logit model with a preference estimate as independent variable, including controls.<sup>4</sup>

**Hypothesis 1.** *The probability to sell a stock is an increasing function of the stock's volatility.*

We find no evidence for this hypothesis, rather we observe (significantly) the reverse. Our regression model (not shown) shows that the probability to hold a stock is a decreasing function of the stock's volatility (and expected return).

**Hypothesis 2.** *The probability to sell a stock is an increasing function of impatience.*

Based on the GLFE logit model we find no evidence for this hypothesis. We actually observe (statistically significant at the 1% level) the reverse, if we take the myopic task as independent variable. The discount factor and discount rate from the CTB are insignificant, also the qualitative impulsiveness is insignificantly related to sell rates. Based on logit models for *each* product, we find mixed evidence, but mostly in favor of the reverse. So, we find that the probability to sell a stock is a decreasing function of impatience.

**Hypothesis 3.** *The probability to sell a stock is a decreasing function of sensitivity to losses.*

We find no evidence in favor of this hypothesis, again we observe the reverse. The quantitative measure of loss aversion  $\lambda$  and the qualitative measure of risk/loss aversion both

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<sup>4</sup>We also run a random effects model to account for repeated observations by the same individual, however a fixed effects model is preferred in terms of AIC, BIC and loglikelihood.

support statistically significantly that more loss averse subjects have a higher probability of selling a stock. We do a robustness check based on the CRRA risk aversion from the CTB, but the CRRA parameter is insignificantly related to selling investments.<sup>5</sup>

**Hypothesis 4.** *More impatient investors allocate more to stocks with low expected returns, and tilt their portfolios more heavily towards volatile stocks.*

For the final hypothesis we find again no evidence. Again, based on the GLFE logit model, we find evidence for the contrary. More patient investors favor significantly product X (low return, high standard deviation) over product Y (high return, low standard deviation).

## IV. Conclusion

In this paper, we field a survey among a representative sample of Dutch individuals to measure preferences and trading behavior during the emergence of the COVID-19 crisis. We elicit and estimate loss aversion, risk aversion, time discounting and probability weighting. During the emergence of the COVID-19 crisis individuals become more impatient and more risk seeking, which is robust to controlling for personal characteristics.

Trading behavior shows a strong disposition effect. The magnitude of the disposition effect correlates negatively with stock market returns during the emergence of the COVID-19 crisis. Days with severe stock market losses predict a large disposition effect the next, while stock market gains predict a small or no disposition effect.

Finally, we relate the estimated preferences with trading behavior and we empirically test the hypotheses of the realization model of Barberis and Xiong (2012). We find no evidence for

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<sup>5</sup>Studying each prospect separately provides evidence that more risk averse subjects have a higher probability of selling investments.

their hypotheses, but we observe the contrary (statistically significant). The probability that the investor sells a stock within a year is a decreasing function of his impatience and of the stock's volatility, and an increasing function of loss aversion. The more striking hypothesis of realization utility is not supported by our experiment: we find that more patient investors allocate more to stocks with low expected returns and higher volatility.

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# Tables

Table 1: **Summary statistics** This table shows some summary statistics of the individuals in our sample.

	Mean	Median	Std. Dev.	<i>N</i>
Male	0.49	0.00	0.50	1961
Age	56.36	57.00	8.55	1961
Members household	2.54	2.00	1.30	1961
Children	0.78	0.00	1.11	1961
Partner	0.73	1.00	0.44	1961
Education (classes)	3.86	4.00	1.41	1954
Income	1884.59	1800.00	1167.62	1961
Income household	3498.88	3278.00	1892.20	1893
Duration (min.)	951.08	15.00	4049.69	1946

Table 2: **Preference estimates.** This table shows the estimates for loss aversion task, present bias task and CTB task (including individual income in the 2-limit TOBIT estimates).

	Median	Mean	Std. Dev.	Q25	Q75	Min.	Max.	<i>N</i>
Loss aversion $\lambda$	2.60	3.09	2.25	1.21	5.00	0.50	7.00	1710
1-Year interest rate	10.00	21.67	29.94	0.00	25.00	0.00	100.00	1614
5-Year interest rate	8.45	11.91	12.26	2.83	14.87	0.00	37.97	1614
Present bias factor $\beta$	0.98	0.94	0.18	0.87	1.00	0.50	1.50	1614
Annual discount factor $\delta$	0.95	0.92	0.08	0.88	0.98	0.67	1.00	1614
Probability weighting $\eta$	1.17	2.08	4.81	-0.36	2.39	-3.89	17.50	1961
Annual discount factor $\delta$	0.92	0.98	0.28	0.82	1.07	0.52	1.74	1961
CRRA curvature $\alpha$	0.47	0.34	0.56	0.23	0.61	-1.29	1.41	1961
CRRA risk aversion $\gamma$	0.53	0.66	0.56	0.39	0.77	-0.41	2.29	1961
Annual discount rate	0.08	0.11	0.31	-0.07	0.22	-0.43	0.92	1961
Annual discount factor $\delta$	0.93	0.97	0.30	0.80	1.11	0.44	1.74	1961
CRRA curvature $\alpha$	0.45	0.46	0.70	0.21	0.61	-1.00	2.47	1961
CRRA risk aversion $\gamma$	0.55	0.54	0.70	0.39	0.79	-1.47	2.00	1961
Annual discount rate	0.07	0.14	0.38	-0.10	0.24	-0.43	1.29	1961

Table 3: **Development (quantitative) preferences during emergence COVID-19 crisis.** This table shows the correlations for the quantitative preference tasks with the day of the month. We use OLS and robust standard errors,  $t$ -values on the second row.

	CTB: 2 - 31 March				CTB: 2 - 24 March	
	Loss aversion	Risk aversion (EG)	Discount factor	Risk aversion	Discount factor	Risk aversion
Day <sub>t</sub>	0.0048 0.8514	0.0020 0.6135	-0.0016 -2.5490	-0.0010 -0.7657	-0.0020 -2.1542	-0.0040 -2.2137
Controls	YES	YES	YES	YES	YES	YES
N	1710	2061	1961	1961	1545	1545

Table 4: **Development (qualitative) preferences during emergence COVID-19 crisis.** This table shows the correlations for the qualitative preference tasks with the day of the month. We use OLS and robust standard errors,  $t$ -values on the second row.

	Risk/loss seeking	Impulsiveness	Myopic	Trust insurers	Insurance product
Day <sub>t</sub>	0.0126 3.1321	0.0059 1.9269	0.0055 1.3851	0.0068 1.9637	-0.0001 -0.1654
Controls	YES	YES	YES	YES	YES
N	1977	2032	2025	1997	2059

Table 5: **Prospects and disposition effect.** This table shows the win and the loss outcomes in each prospect, and the hold rates og winners/losers.

Prospect	Win/lose	Losers	Winners	Difference
1. (A,B)	+3000/-4000	0.393	0.210	0.183
2. (C,D)	+4000/-4000	0.507	0.221	0.286
3. (E,F)	+5000/-4000	0.589	0.225	0.363
4. (X)	+6000/-5000	0.569	0.231	0.338
4. (Y)	+4000/-2000	0.449	0.221	0.228

Table 6: **Regression analysis disposition effect.** This table shows estimated coefficients for the regression with dependent variable *hold* (dummy, = 1 hold investment, = 0 sell investment) on *loss* (dummy, = 1 loss after first toss, = 0 gain after first toss) and EV (expected return on investment). We control for personal characteristics and week dummies. We fit a generalized linear fixed-effects model with a logit link.

Hold $\sim$	Estimate	SE	<i>t</i> -stat	<i>p</i> -value	Lower	Upper
Constant	-0.66	0.52	-1.28	0.20	-1.68	0.35
loss	1.24	0.13	9.26	0.00	0.97	1.50
EV	0.20	0.13	1.63	0.10	-0.04	0.45
male	0.38	0.14	2.60	0.01	0.09	0.66
age	-0.01	0.01	-1.55	0.12	-0.03	0.00
edu4	-0.10	0.25	-0.40	0.69	-0.59	0.39
edu5	-0.26	0.17	-1.58	0.11	-0.59	0.06
edu6	-0.24	0.17	-1.44	0.15	-0.57	0.09
income	0.00	0.00	0.27	0.78	0.00	0.00
week2	-0.08	0.18	-0.42	0.67	-0.44	0.28
week3	-0.20	0.21	-0.99	0.32	-0.61	0.20
week4	0.13	0.17	0.75	0.45	-0.20	0.46
Num. obs.	1132					

# Figures

Figure 1: Distribution CRRA parameter Eckel & Grossman task.

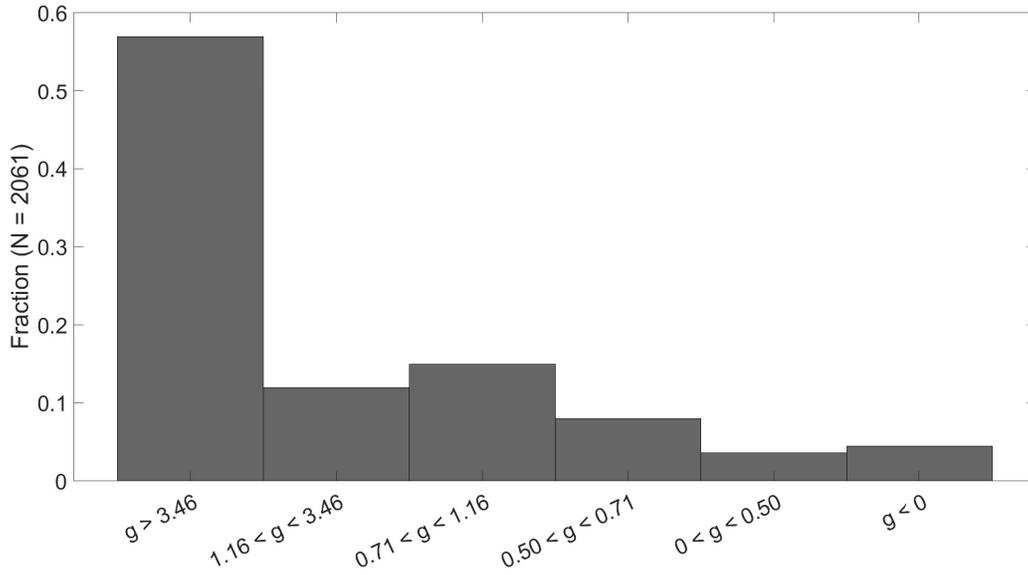


Figure 2: Choice behavior Convex Time Budgets. Median allocated Euros at early payment against the gross interest rate  $1 + r$  for several back-end delays  $k$  and payout probabilities  $p$  in the Convex Time Budgets.

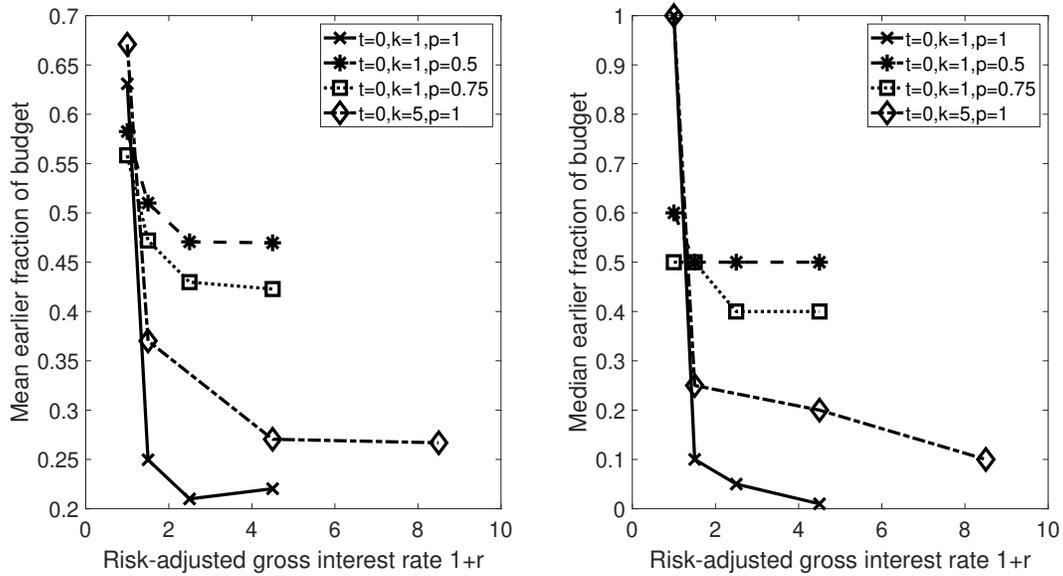


Figure 3: **Estimated distribution of individual present bias, annual discounting and curvature parameters.** Responses are winsorised at the 5% level.

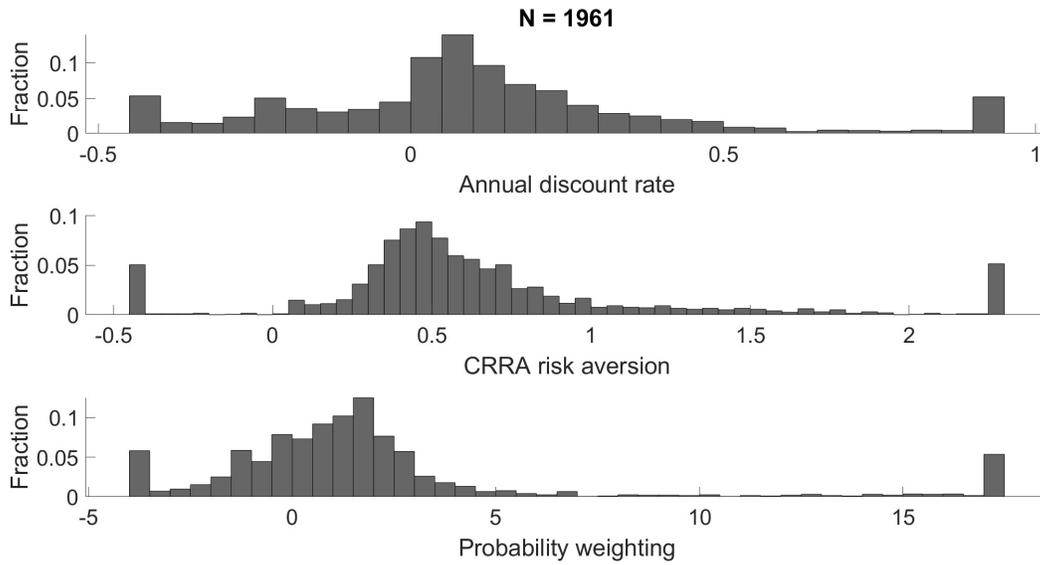


Figure 4: **Distribution of responses qualitative tasks.** The top panel measures risk/loss aversion, the middle panel measures impulsiveness and the bottom panel measures myopia (i.e., short-sighted behavior).

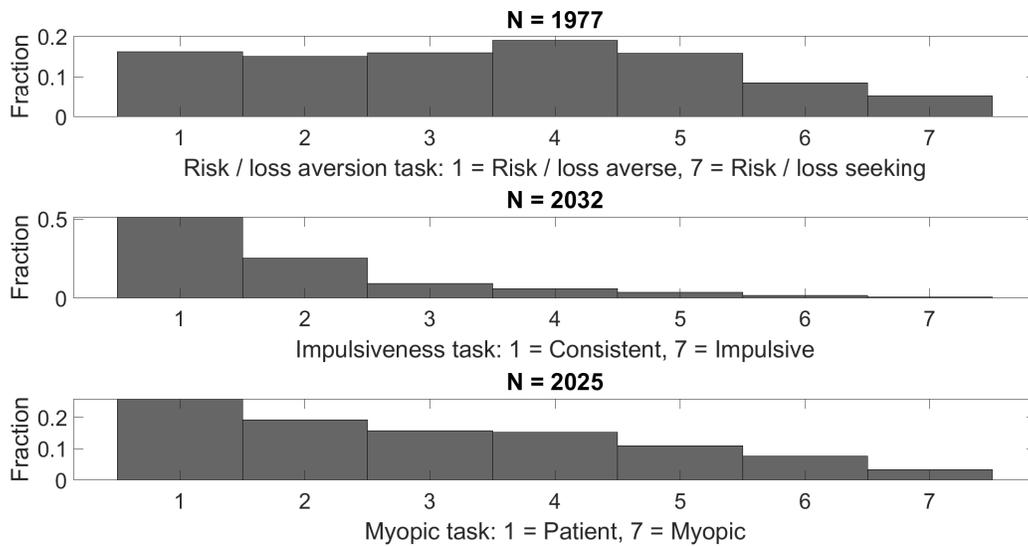


Figure 5: **Distribution of responses insurers tasks.** The top panel measures the amount of trust in insurance companies, and the bottom panel measures the attitude towards the annuity product (flat or flexible payments).

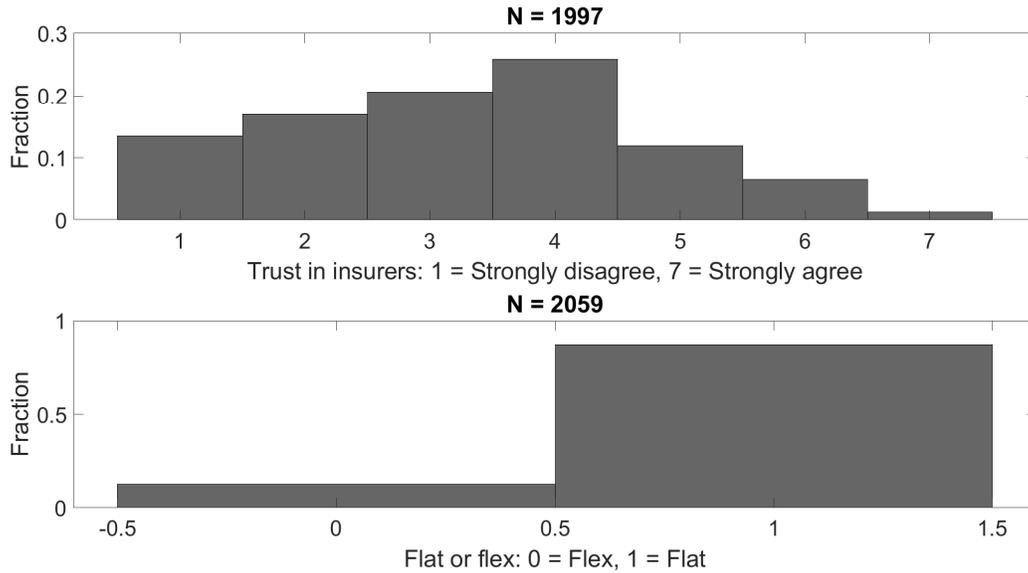
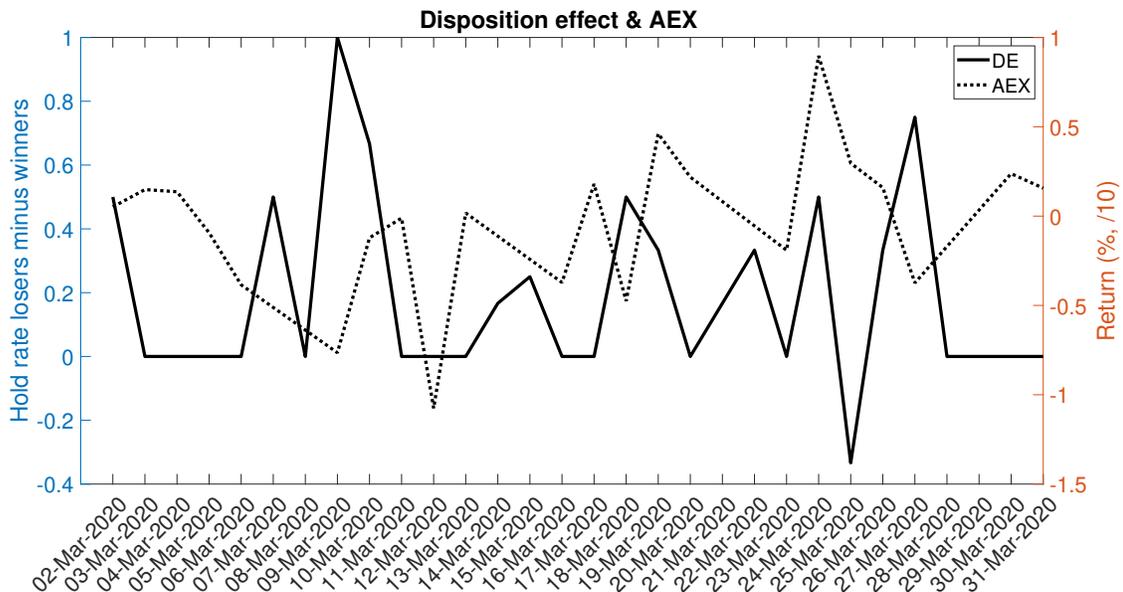


Figure 6: **Disposition effect and AEX returns.** The figure shows the difference in hold rates among losing and winning stocks (left  $y$ -axis) and the daily returns on the AEX index (right  $y$ -axis). We use linear interpolation between returns on non-trading days (i.e., the weekends).



# Appendix