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Joop Adema, Till Nikolka, Panu Poutvaara, Uwe Sunde

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Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
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On the Stability of Risk Preferences: Measurement Matters

Abstract

We exploit the unique design of a repeated survey experiment among students in four countries to explore the stability of risk preferences in the context of the COVID-19 pandemic. Relative to a baseline before the pandemic, we find that self-assessed willingness to take risks decreased while the willingness to take risks in an incentivized lottery task increased, for the same sample of respondents. These findings suggest domain specificity of preferences that is partly reflected in the different measures.

JEL-Codes: D120, D910, G500.

Keywords: stability of risk preferences, measurement of risk aversion, Covid-19.

Joop Adema
ifo Institute – Leibniz Institute for Economic Research at the University of Munich / Germany
adema@ifo.de

Till Nikolka
German Youth Institute (DJI)
Munich / Germany
nikolka@dji.de

Panu Poutvaara
ifo Institute – Leibniz Institute for Economic Research at the University of Munich / Germany
poutvaara@ifo.de

Uwe Sunde
Department of Economics
University of Munich / Germany
uwe.sunde@econ.lmu.de

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1 Introduction

Over the past years, much progress has been made on measuring risk preferences and their distribution in the population. While there is evidence for considerable heterogeneity of risk preferences and for their systematic changes over the life course, less is known about the stability of preferences in the context of extreme events (see Schildberg-Hörisch, 2018). Previous research suggests that health shocks, natural disasters, wars, and economic recessions affect the willingness to take risks, in some cases leading to lower willingness to take risks (see, e.g., Decker and Schmitz, 2016, Dohmen et al., 2016; Cassar et al., 2017), and, in other cases, to greater risk tolerance (see, e.g., Hanoka et al., 2018, Jakela and Ozier, 2019).

A number of recent papers have used the outbreak of the COVID-19 pandemic to investigate the stability of risk preferences. These studies are typically based on convenience samples and a variety of measures of risk preferences, including self-assessments and hypothetical lotteries, and report mixed, often insignificant, and partly contradictory evidence (see, e.g., Angrisani et al., 2020, for students and traders in London; Drichoutis and Nagya, 2021, for students in Athens; Zhang and Palma, 2021, for online experiments on Amazon's MTurk; and Shachat et al., 2021, for students in China). In contrast, work based on large representative household panel surveys, which have information also prior to the pandemic, typically find modest evidence for a decrease in self-assessed willingness to take risks, particularly among respondents who experienced severe financial losses due to the pandemic and who had pre-existing medical conditions (see, e.g., Graeber, et al., 2020; Frondel et al., 2021, for surveys conducted in Germany). However, these studies do not elicit incentivized risk preferences.

This article contributes a systematic assessment of the stability of risk preferences in the context of the COVID-19 pandemic, among students in four countries. Our study leverages a survey design that comprises information collected among student samples in several countries prior to the outbreak of the pandemic and during the pandemic, and that contains both self-assessed ("stated") measures of risk preferences and measures based on an incentivized lottery choice ("elicited" measures).

The results show a considerable heterogeneity in the response of risk preferences to the pandemic across different measures. In particular, we find that on average self-assessed risk preferences decreased whereas the willingness to take risks in an incentivized lottery task increased during the pandemic, *for the same individuals*.

2 Data and Empirical Strategy

Data The data were collected at universities in different countries (Czechia, India, Mexico, and Spain) as part of a research project on language learning and migration intentions among university students. During the baseline survey, collected in 2019, prior to the outbreak of the COVID-19 pandemic, respondents were requested a permission to be contacted again for a follow-up survey, which took place in December 2020 and January 2021. We restrict the sample to countries with at least 20 respondents in the follow-up survey.[1]

In both waves, we collected the same two measures for risk attitudes: self-assessed willingness to take risks ("stated risk preference"), and an incentivized multiple item lottery decision task ("elicited risk preference").[2] To measure within-individual variation in preferences, we restrict the sample to those respondents with information on both measures in both surveys who were still students at the time of the follow-up survey.[3] The estimation sample consists of 303 individuals with information on risk preferences from 9 universities in the Czechia, India, Mexico, and Spain.[4]

Empirical Strategy The analysis is based on the fixed-effects regression framework

$$\text{Pref}_{iw} = \alpha \cdot \text{Follow-up}_w + \beta \cdot \text{Follow-up}_w \times X_i + \zeta_i + \varepsilon_{iw} \tag{1}$$

with Pref_{iw} denoting a preference measure for respondent i in wave w (baseline, follow-up) and Follow-up_w denoting a binary indicator for responses given during the follow-up survey. The coefficient of interest regarding the effect of the pandemic on preferences is given by α, and β provides information about heterogeneity in the effect of the pandemic on preferences by individual characteristics X_i that are stable over time and that were elicited in the baseline survey (such as gender or age at the time of the baseline survey).

[1] The timing of the baseline varied across countries and universities. See Appendix Figure A1 and Appendix Table A1.

[2] The self-assessment about risk preference (stated risk preference) is the response to the question *Would you describe yourself as someone who tries to avoid risks (risk-averse) or as someone who is willing to take risks (risk-prone)?* with responses on a scale 0–10. Elicited risk preference: *Assume that you win the first of the two additional lotteries and obtain €100. You have to decide now how much of the amount of €100 you want to invest in a risky asset. The risky asset loses the invested money with a probability of 1/2 and gives you 2.5 times the invested amount with a probability of 1/2. For example: if you do not invest anything, you keep the €100; if you invest everything, you end up with either €0 or €250.* Response range 0–100. For a similar approach, see, e.g., Falk et al. (2018). We also collected comparable measures for time preferences, shown in the Online Appendix.

[3] Around 30% of respondents reply negatively to the question about student status in the follow-up survey. To rule out contamination of treatment from graduation and job search, we exclude these respondents from the sample.

[4] Descriptive statistics can be found in Appendix Table A2.

3 Empirical Results

Cross-tabulations Comparing self-reported risk preference in the baseline survey in 2019 to the follow-up survey during the pandemic, 30% of the respondents gave the same answer in both surveys, while 43% (28%) of respondents reported a lower (higher) willingness to take risks in the follow-up survey. Most of the changes are minor: 64% of respondents reported either exactly the same risk preference, or changed their answer by one choice category. For elicited risk preference, 26% of respondents were in the same 10€-bin in both surveys, while 28% (46%) chose lower (higher) risky investment in the follow-up survey, and 45% of respondents chose risky investment in both surveys in either the same or in the adjacent range. This suggests that risk preferences move, on average, in opposite directions when using self-reported and elicited risk-taking.

Regressions Table 1 presents the econometric analysis of the effect of the exposure to the COVID-19 pandemic on stated risk preferences (Panel A) and on elicited risk preferences (Panel B) for different specifications. The results in Panel A suggest that the stated willingness to take risks declined during the pandemic. This decline is particularly pronounced among female respondents aged 20 and younger. The results in Panel B provide a completely different picture: The willingness to invest in a risky lottery increased, and this is mainly the case for male respondents aged 21 and older.

Our results cast doubt on a uniform effect of the pandemic on risk preferences. Instead, the findings seem to hinge critically on the specific measures of risk preferences, which differ conceptually regarding the perception of risk exposure and the context. In particular, the stated risk preference has been shown to be a good overall measure of risk attitudes across various domains besides the financial domain, including, in particular, health-related risks (see, e.g., Dohmen et al., 2011). In contrast, the elicited risk preference refers to the conventional incentivized elicitation protocol in the financial domain. While the stated risk measure is more ambiguous regarding the risks involved in the individual assessment, the elicited risk measure is explicitly about financial risk taking and involves exact stakes and probabilities, which might induce responses to be influenced by the particular financial context of the respondent. The salience of these differences might vary across gender and age.

Overall, the seemingly contradictory responses of individuals in our sample that exhibit simultaneously increasing and decreasing risk preferences, depending on the measure, shed new light on the inconclusive evidence in the literature. The findings therefore raise a note of caution about measuring the stability of risk preferences using a single measure. Moreover, the heterogeneous findings seem to be driven by distinct subsamples in terms of gender and age. This suggests a potentially important role of heterogeneity in the

Table 1: The Effect of the COVID-19 Pandemic on Risk Preferences

	Panel A: Stated Risk Preference						
Subgroup:		All		Females Age< 21	Females Age≥ 21	Males Age< 21	Males Age≥ 21
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Follow-up	-0.389**	-0.086	-0.592***	-0.824***	-0.381	-0.214	0.014
	(0.151)	(0.228)	(0.222)	(0.282)	(0.279)	(0.354)	(0.302)
Follow-up × Female		-0.525					
		(0.303)					
Follow-up × $I(age \geq 21)$			0.393				
			(0.302)				
Respondent FEs	✓	✓	✓	✓	✓	✓	✓
Observations	606	606	606	182	168	112	144
R^2	0.77	0.77	0.77	0.79	0.75	0.73	0.80
	Panel B: Elicited Risk Preference						
Subgroup:		All		Females Age< 21	Females Age≥ 21	Males Age< 21	Males Age≥ 21
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Follow-up	6.561**	9.430**	3.327	5.297	3.560	0.125	16.667***
	(2.616)	(4.262)	(3.368)	(4.419)	(4.911)	(5.187)	(6.210)
Follow-up × Female		-4.967					
		(5.377)					
Follow-up × $I(age \geq 21)$			6.282				
			(5.189)				
Respondent FEs	✓	✓	✓	✓	✓	✓	✓
Observations	606	606	606	182	168	112	144
R^2	0.69	0.70	0.70	0.71	0.70	0.70	0.63

Note: Standard errors, clustered at the respondent level, in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

stability of preferences in different domains that deserves attention in future research.[5] The main threat to identification is self-selection to repeat participation. Extensive analysis of self-selection suggests that selective participation in the follow-up survey is unlikely to explain our results.

More systematic work is needed for a better understanding of the stability or preferences and its relationship to different survey measures.

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[5]We also found heterogeneous yet insignificant effects for time preferences, using similar self-reported (stated) measures or incentivized (elicited) measures. See Appendix Tables A6 to A8.

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Appendix

Procedural Details

The survey was fielded in 9 universities in 4 countries. Participants in the surveys were recruited by contacting first professors in selected universities. In case a university or faculty agreed to participate, either a professor or departmental secretary sent an invitation email to all its students, inviting participation. The emails were always first in the local language, followed by English, to reach international students. In the email, students were informed: "As a small thanks for your participation, at the end of the survey you can participate in three lotteries. One lottery has a prize of 100 euros. The prizes of the other lotteries are explained at the end of the survey." The other lotteries were the incentivized risk and time preference choices. Each university had its own lotteries in the first wave, while joint lotteries were used in the follow-up survey. The invitation email sent to students of IIT Kanpur in India is displayed below:

Dear Students,

We are researchers at the University of Munich and the ifo Institute and we are carrying out a research project about language learning and migration intentions. We are interested in your answers irrespective of whether you are considering migration or whether you study foreign languages.

As a small thanks for your participation, you can participate in three lotteries. One lottery has a prize of 100 euros. The prizes of the other lotteries are explained at the end of the survey. To find out more about the survey and to take part, please click on the following link:

[Insert hyperlink]

The data collection will close on April 30th 2019. The data collected is used only for scientific research. We ask for your email address in case you want to take part in the lottery or be informed about the results of our study, but the email address will be removed from the database before data analysis. Data storage and processing will follow the European General Data Protection Regulation. You will find more information about this when you click on the link above.

Thank you for your time and for your participation.

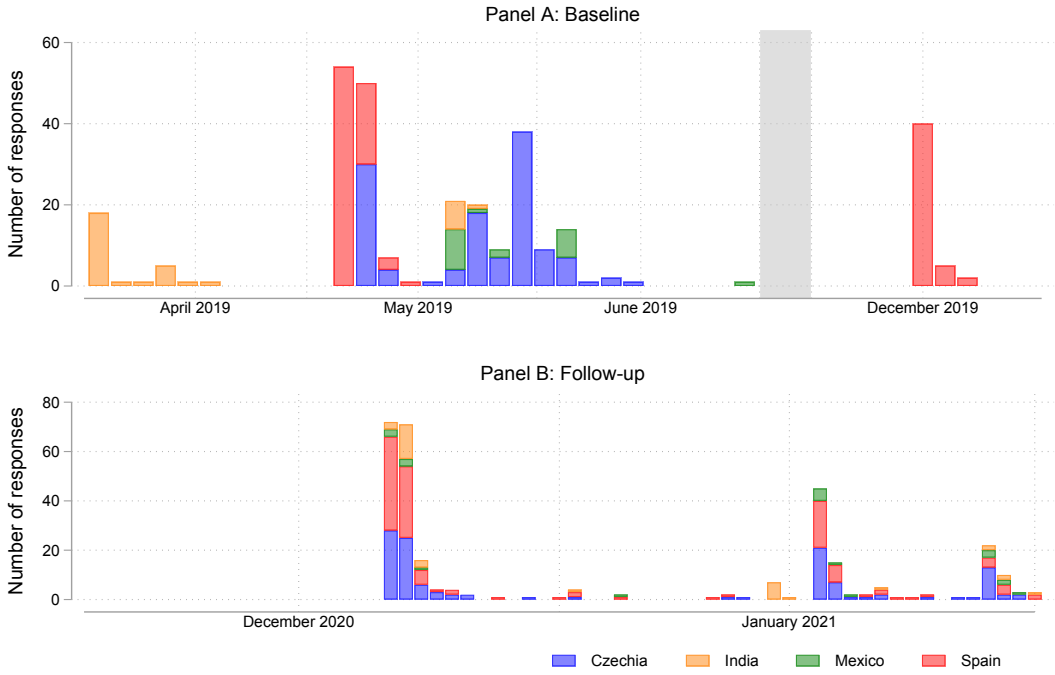
Dr. Till Nikolka, ifo Institute
Prof. Panu Poutvaara, University of Munich and ifo Institute

Descriptive Statistics

The timeline of our baseline sample is displayed in Appendix Figure A1. Panel A shows that most baseline survey responses were collected between May and July 2019, and the remaining ones (from the University of Barcelona) in December 2019. The follow-up responses were collected in December 2020 and January 2021 (Panel B). Panel A shows that the surveys were fielded at different times at different universities, whereas Panel B shows the a peak for the first follow-up email and two reminder emails. Timing of the reminders for India differed from that of the other countries. During the run of the follow-up survey COVID-19 incidence rates and stringency of COVID-19 related non-pharmaceutical measures were relatively stable in the four countries.

Table A1 lists all universities that were included in the sample. In total, 33,298 students received invitation

Figure A1: Overview of the Distribution of Responses for the Main Sample



e-mails. The reported numbers correspond to an overall response rate of 10.6%, a return rate of 14.6% and 58.6% of returning respondents' replies are used.[6] Response rates vary between 3.9% for the University of Barcelona to 39.9% for COLMEX.

Table A2 features descriptive statistics, including time preferences. The differences in both stated and elicited time preferences between the two waves are small. The vast majority of respondents are bachelor students in the baseline survey. Women are in the majority.

Table A3 displays the average values of stated and elicited risk preference per university for both waves. Stated risk preferences decreased in all universities apart from VSE, where they remained unchanged. Elicited risk preferences increased in all universities.

[6]Not all returning respondents' surveys are part of the final sample, because of missing responses in either of the risk preference questions, questions related to student status, or due to graduation (see main text).

Table A1: Target Group and the Number of Respondents by University

	Target population	Respondents in the baseline survey	Respondents in the follow-up survey	Final sample
Czechia				
Masaryk University, Brno	2255	495	105	60
University of Ostrava	2684	324	25	12
VSE, Prague	3917	553	93	50
India				
IIT Kanpur	5261	929	41	27
Ashoka University, Sonipat	1980	57	12	8
Spain				
Carlos III, Madrid	9645	718	127	78
University of Barcelona	6712	260	70	47
Mexico				
COLMEX, Mexico City	368	147	26	14
CIDE, Mexico City	476	59	18	7

Overview of stated and elicited risk preference, the size of the target group, and baseline and follow-up response numbers by university. A respondent is counted once she entered the first page of the survey. Thus, the actual number of useful responses is lower due to attrition. VSE refers to the Prague University of Economics and Business, from which two faculties (Economics and International Relations) participated, each with separate lotteries.

Table A2: Descriptive Statistics of Main Variables of Main Estimation Sample

	Baseline		Follow-up	
	Mean	S.D.	Mean	S.D.
Stated risk preference	5.98	2.00	5.59	2.05
Elicited risk preference	41.9	27.7	48.4	30.5
Stated patience	6.03	2.24	5.91	2.28
Elicited patience	6.31	2.87	6.12	2.80
Age during first wave	21.2	2.57		
Share of Bachelor students	0.81		0.64	
Share of women	0.57			
Share in Czechia	0.40			
Share in India	0.12			
Share in Mexico	0.07			
Share in Spain	0.41			

The number of respondents is 303 for both waves, except for the two patience-related questions. Those are based on 294 respondents, as some respondents did not fill out the elicited patience-question, which was the final question in both questionnaires.

Cross-tabulations Tables A4 and A5 cross-tabulate the range of stated and elicited risk preference in the baseline and follow-up survey.

Table A3: Stated and Elicited Risk Preference by University and Wave

	Stated risk preference		Elicited risk preference	
	Baseline	Follow-up	Baseline	Follow-up
Czechia				
Masaryk University, Brno	5.38	5.32	40.5	45.1
University of Ostrava	4.83	4.33	30.4	39.6
VSE, Prague	5.82	5.82	43.5	57.3
India				
IIT Kanpur	6.41	6.15	46.6	46.8
Ashoka University, Sonipat	6.13	5.50	36.3	43.0
Spain				
Carlos III, Madrid	6.40	5.86	42.4	45.5
University of Barcelona	6.17	5.38	41.6	51.6
Mexico				
COLMEX, Mexico City	5.71	5.43	36.4	46.8
CIDE, Mexico City	7.14	5.28	57.1	66.4

Overview of stated and elicited risk preference, the size of the target group, and baseline and follow-up response numbers by university. A respondent is counted once she entered the first page of the survey. Thus, the actual number of useful responses is lower due to attrition.

Table A4: Transition Table for Stated Risk Preference

		Baseline										
Stated Risk Preference		1	2	3	4	5	6	7	8	9	10	$\sum$
Follow-up	1	0	1	1	0	0	0	0	1	0	0	3
	2	0	5	5	0	0	0	0	0	1	0	11
	3	0	4	13	9	5	6	5	2	0	0	44
	4	0	1	6	10	6	14	11	3	2	0	53
	5	0	2	7	3	5	5	4	3	2	0	29
	6	0	0	2	6	6	12	10	6	2	0	44
	7	0	0	1	2	2	6	26	17	3	0	57
	8	0	1	2	1	2	6	13	16	2	2	45
	9	0	0	0	0	0	0	1	8	1	2	12
	10	0	0	0	0	0	1	0	2	0	2	5
	$\sum$	0	14	36	31	26	50	70	57	13	6	303

Time Preference

The self-assessment of time preference (stated time preference) is the response to: *Would you describe yourself as an impatient or a patient person in general?* with responses on a scale 0–10. Elicited time preference: *You have to decide now whether you want to get the €100 today or whether you want to wait for three months in order to get a potentially larger amount. Please choose for each of the following 10 scenarios whether you want to get the money right after the drawing or three months later.* **100 or 100 + 4n in 3 months for all n in N = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}**. The earlier one switches to the option in 3 months, the more patient. To construct a measure of patience, we consider the step at which the respondents first switch to the later option n and take $10 - n$ as a measure of patience. For those who never switch to the option in 3 months,

Table A5: Transition Table for Elicited Risk Preference

Follow-up: Risky Investment	Base: 0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94	95-100	$\sum$
0-4	13	2	1	0	1	8	0	0	1	0	2	28
5-14	5	2	1	0	0	0	0	0	1	0	0	9
15-24	5	1	7	4	0	6	0	1	0	0	0	24
25-34	4	2	9	6	2	14	1	1	1	1	2	43
35-44	2	0	3	3	1	11	2	2	1	0	2	27
45-54	9	2	5	13	7	35	2	3	4	0	3	83
55-64	1	0	0	1	2	4	0	2	0	0	0	10
65-74	1	0	0	0	2	3	1	1	1	0	1	10
75-84	0	0	2	4	1	6	3	1	0	0	2	19
85-94	0	0	0	0	0	0	0	1	1	0	0	2
95-100	3	0	4	2	3	19	0	0	3	1	13	48
$\sum$	43	9	32	33	19	106	9	12	13	2	25	303

patience has value 0, whereas for those who switch already in $n = 0$, patience has value 10. However, elicited patience is ambiguous for individuals switching forth and back. This concerns 10 respondents in either of the surveys. We omit these from the analysis.

Cross-tabulations Below we provide transition tables for both measures of time preference. Most of the changes are minor: 60% of respondents reported either exactly the same time preference, or changed their answer with one step. The elicited measure of risk preference is less stable: 49% of respondents reported either exactly the same time preference, or changed their answer with one step. As with elicited risk preferences, elicited time preferences are bunched.

Table A6: Transition Table for Stated Time Preference

Follow-up: Stated Patience	Base: 1	2	3	4	5	6	7	8	9	10	$\sum$
1	0	2	2	0	0	0	0	0	0	0	4
2	1	2	3	1	1	1	2	0	0	0	11
3	2	2	8	10	6	5	4	2	3	1	43
4	0	2	12	7	6	6	4	3	0	0	40
5	0	0	3	4	7	5	6	5	0	0	30
6	0	0	2	3	6	5	4	2	3	1	26
7	0	0	7	4	6	5	15	13	3	0	53
8	0	0	1	6	3	4	6	11	13	1	45
9	0	1	1	2	0	1	4	7	14	3	33
10	0	0	0	0	0	0	4	0	1	4	9
$\sum$	3	9	39	37	35	32	49	43	37	10	294

Regressions Table A8 shows the regressions for stated and elicited time preferences, analogous to Table 1 in the main text. In none of the columns a statistically significant shift in time preferences is found.

Table A7: Transition Table for Elicited Time Preference

Elicited Patience	Base 0	1	2	3	4	5	6	7	8	9	10	$\sum$
Follow-up 0	6	2	2	2	0	1	1	1	1	4	4	24
1	0	1	0	0	0	0	0	0	0	0	0	1
2	3	0	1	1	0	1	1	1	0	2	1	11
3	1	0	2	1	2	2	0	0	1	2	0	11
4	2	0	0	2	0	4	3	2	0	3	0	16
5	3	1	2	2	6	19	6	8	1	10	4	62
6	2	0	0	1	0	4	1	3	5	3	1	20
7	3	1	0	0	1	7	8	10	3	10	2	45
8	1	0	0	0	0	3	0	2	3	6	0	15
9	1	0	2	1	1	11	7	10	3	34	3	73
10	1	0	0	0	0	2	1	1	1	1	9	16
$\sum$	23	5	9	10	10	54	28	38	18	75	24	294

Table A8: The Effect of the COVID-19 Pandemic on Time Preferences

	Panel A: Stated Time Preference						
Subgroup:		All		Females Age< 21	Females Age≥ 21	Males Age< 21	Males Age≥ 21
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Follow-up	-0.116	-0.175	-0.140	-0.202	0.076	-0.037	-0.278
	(0.178)	(0.263)	(0.259)	(0.321)	(0.366)	(0.444)	(0.323)
		0.103					
		(0.357)					
Follow-up × $I(age \geq 21)$			0.047				
			(0.357)				
Respondent FEs	✓	✓	✓	✓	✓	✓	✓
Observations	588	588	588	178	158	108	144
R^2	0.77	0.77	0.77	0.79	0.75	0.73	0.80
	Panel B: Elicited Time Preference						
Subgroup:		All		Females Age< 21	Females Age≥ 21	Males Age< 21	Males Age≥ 21
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Follow-up	-0.184	-0.508	-0.182	0.213	-0.114	-0.833	-0.264
	(0.267)	(0.462)	(0.379)	(0.432)	(0.458)	(0.698)	(0.621)
Follow-up × Female		0.567					
		(0.558)					
Follow-up × $I(age \geq 21)$			-0.004				
			(0.536)				
Respondent FEs	✓	✓	✓	✓	✓	✓	✓
Observations	588	588	588	178	158	108	144
R^2	0.67	0.68	0.67	0.76	0.72	0.60	0.57

Note: Standard errors, clustered at the respondent level, in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Self-Selection

Within waves, on risk and time preferences A major concern about our analysis relates to self-selection on the dependent variables (or an unobserved common cause of risk (or time) preferences and the participation decision) between the baseline survey and the follow-up survey, and within both survey waves. We explore this issue by regressing a dummy for completing the baseline survey on stated risk and time preferences. The results reveal that respondents with high degree of stated patience and risk preference are more likely

to complete the survey (see Table A9), suggesting that the estimation sample is somewhat more patient and risk prone than the population of all respondents (students).

Table A9: Completing the Baseline Survey: Selection on Observable Characteristics

	(1) Finishes survey
Stated risk preference	0.008**
	(0.004)
Stated time preference	0.009**
	(0.004)
$I(age \geq 21)$	0.024
	(0.019)
Female	-0.076***
	(0.018)
Partner (married or unmarried)	0.021
	(0.019)
University FEs	✓
Observations	3261
R^2	0.13

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Between waves, on risk and time preferences Regressing a dummy for participating in the follow-up survey on risk and time preferences, we find a positive association with elicited patience (+0.012, highly significant) and a negative association (-0.010, just significant) with stated risk (see Table A10). We refer to this as the selection bias and denote it by Δ. In the following, we provide an assessment of the resulting bias on stated risk preferences in our results.

In the case of perfect preference stability between baseline and follow-up survey, a selection bias on preferences cannot lead to a spurious result, as we rely on within-respondent variation. However, in the case of a constant average level of preferences but random variation in preferences across individuals (according to some distribution, for instance measurement error), a possible selection effect in the preference may lead to biased estimates. To see this, consider individuals whose preference increased by δ units between the two waves and who are therefore more likely to return to the second wave than whose preferences decreased by δ. In order to assess whether the size of the selection bias, Δ, can explain the main results, we approximate the effect size that a similar selection bias based on the second wave risk preference has.

Concretely, suppose that the probability for an individual to answer in the follow-up survey with first wave preference L depends on the average return probability and an idiosyncratic random linear shift in risk preference of $+\delta$ (which is unobserved and, for simplicity, drawn from a symmetric distribution with mean 0): $P^{return}_{L,\delta} = \bar{P}_L + \delta\Delta$. For simplicity, suppose there is no selection effect that affects the responses in the

baseline survey, i.e., assume that $\bar{P}_L = \bar{P}$.[7] Suppose that $\bar{P}$ is 0.2, as 20% of first survey respondents answer in the second wave and assume that there is no systematic change in risk preferences between the first and the second wave for the entire population. The distribution of absolute deviations $|\delta|$ is assumed to be identical to the observed distribution of returning respondents. As $|\delta|$ is discrete, we observe the share of respondents S_δ changing their risk preference S_δ by δ: 31% does not change their stated risk preference, 36% changes their stated risk preference by 1 step, 17% by 2 steps, 10% by 3 steps, 4% by 4 steps, 2% by 5 steps, and 1% by 6 steps. Finally, suppose that the size of the change in preferences does not affect the probability to respond to the follow-up survey, only the absolute level of second period risk preference does.

Under the assumptions above, every group with a particular realization of $|\delta|$ with first wave risk preferences L is split in half, with one half of the group experiencing an increase by δ and the other half experiencing a decrease by δ. The former group has probability $\bar{P} + \delta\Delta$ to respond to the follow-up survey, whereas the latter group has probability $\bar{P} - \delta\Delta$. Under these assumptions, the bias on the effect size amounts to

$$T_\delta = \frac{2\delta^2\Delta}{2\bar{P}} \tag{A1}$$

and the corresponding bias for the full sample is $\sum_\delta S_\delta T_\delta$, where $\sum_\delta S_\delta = 1$. Thus, the lower the overall response rate, the more severe the bias, and the larger the deviations $|\delta|$ are, the more severe the bias. Using the information about the distribution of $|\delta|$ of those respondents who participate in the follow-up survey, the average return rate $\bar{p}$ and the selection bias using Δ, the average bias amounts to $\sum_\delta S_\delta T_\delta = -0.165$, which is more than a factor of two smaller than the effect size found in the main results for stated risk preferences. This alleviates concerns of the effect being driven mainly by selective sampling and attrition between the two waves of the survey.

A similar calculation for elicited patience delivers a bias of +0.34, suggesting the true effect may indeed be negative even though the main results do not reveal a statistically significant effect for patience.

[7] Relaxing this assumption would require to sum (A1) below over L and using a distribution of $|\delta|$ over L.

Table A10: Repeat Survey Participation: Selection on Observable Characteristics

	(1)	(2)	(3)	(4)
	Responds in the follow-up survey			
Self-assessed risk from 1 to 10		-0.009*		-0.010*
		(0.005)		(0.005)
Self-assessed patience from 1 to 10		0.007		0.006
		(0.004)		(0.004)
Elicited risk preference			0.000	0.000
			(0.000)	(0.000)
Inferred incentivized patience from 0 to 10			0.012***	0.012***
			(0.003)	(0.003)
Follow-up $\times$ $I(age \geq 21)$	-0.091***	-0.092***	-0.090***	-0.091***
	(0.024)	(0.024)	(0.024)	(0.024)
Female	-0.010	-0.006	-0.006	-0.002
	(0.022)	(0.022)	(0.022)	(0.023)
Partner (married or unmarried)	0.008	0.007	0.007	0.006
	(0.022)	(0.022)	(0.022)	(0.022)
University FEs	✓	✓	✓	✓
Observations	1635	1635	1635	1635
R^2	0.04	0.04	0.05	0.05

Note: Robust standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.