Risk and Time Preferences and Financial Decisions of Couples

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Preliminary version

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Understanding Society

Overview

- Experiment on risk and time attitudes in a representative sample of Dutch couples (LISS panel)

- Random Coefficients model to estimate risk and time preferences from the experimental data

- Predictions of three individual specific parameters: risk aversion, time preference, tendency to make suboptimal decisions

- Compare these parameters for the two partners in a couple

- Use these parameters to explain financial decisions of the household

- Focus on the weights of the two partners in the household decision process

The Experiment: a screenshot
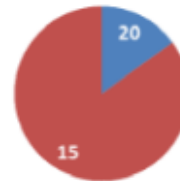
See, e.g.,
Holt and Laury,
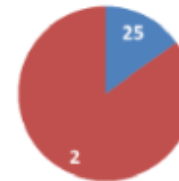AER 2002

and Von Gaudecker et al,
AER 2011

Maakt u alstublieft een keuze tussen A en B voor elk van de twee opties (links of rechts) hieronder:
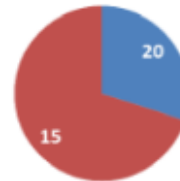
Optie A
Uitbetaling over **3 MAANDEN**

Optie B
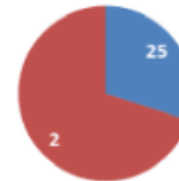**DIRECTE** uitbetaling

A   B

€20 met een kans van 15%
€15 met een kans van 85%

€25 met een kans van 15%
€2 met een kans van 85%

€20 met een kans van 30%
€15 met een kans van 70%

€25 met een kans van 30%
€2 met een kans van 70%

€20 met een kans van 50%
€15 met een kans van 50%

€25 met een kans van 50%
€2 met een kans van 50%

€20 met een kans van 85%
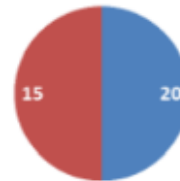€15 met een kans van 15%

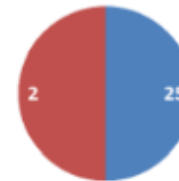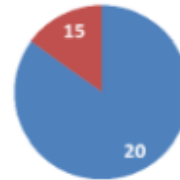€25 met een kans van 85%
€2 met een kans van 15%

€20 met een kans van 100%
€15 met een kans van 0%

€25 met een kans van 100%
€2 met een kans van 0%

Vorige

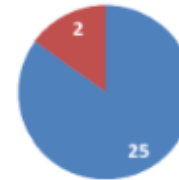Verder

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An example of a choice (one screen = five choices)

Option A
Payment in **3 MONTHS**

Option B
DIRECT Payment

A   B
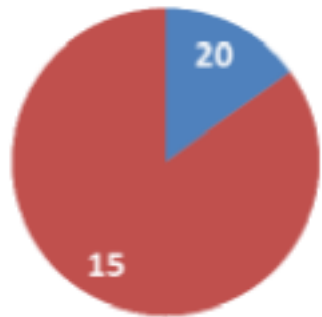
€20 with 15% chance
€15 with 85% chance

€25 with 15% chance
€2 with 85% chance

○   ○

Experimental design

- Same experiment for all respondents

- Choices between less risky option (A) and riskier option (B)

- Nonnegative pay-offs only (no loss aversion)

- Four "treatments" (= four screens)

- Each treatment has five choices; 20 choices in total

- Within treatment: probability of high pay-off increases

- Across treatments: variation in pay-off amounts and timing of payment

  (0 months, 3 months, 6 months, 9 months after the experiment)

- Actual payment: probability 0.1, one of the 20 choices is randomly selected

- All respondents are paid for participating

Table A.1: Details of the experimental design

Treatment	p_A	$\$_{Ah}$	p_A	$\$_{Al}$	EVA	p_B	$\$_{Bh}$	p_B	$\$_{Bl}$	EVB	EVA-EVB
Timing		6 months					3 months				
I	0.15	11	0.85	9	9.3	0.15	23	0.85	0	3.45	5.85
	0.3	11	0.7	9	9.6	0.3	23	0.7	0	6.9	2.7
	0.5	11	0.5	9	10	0.5	23	0.5	0	11.5	-1.5
	0.85	11	0.15	9	10.7	0.85	23	0.15	0	19.55	-8.85
	1	11	0	9	11	1	23	0	0	23	-12
Timing		9 months					6 months				
II	0.15	15	0.85	10	10.75	0.15	29	0.85	4	7.75	3
	0.3	15	0.7	10	11.5	0.3	29	0.7	4	11.5	0
	0.5	15	0.5	10	12.5	0.5	29	0.5	4	16.5	-4
	0.85	15	0.15	10	14.25	0.85	29	0.15	4	25.25	-11
	1	15	0	10	15	1	29	0	4	29	-14
Timing		3 months					0 months				
III	0.15	20	0.85	15	15.75	0.15	25	0.85	2	5.45	10.3
	0.3	20	0.7	15	16.5	0.3	25	0.7	2	8.9	7.6
	0.5	20	0.5	15	17.5	0.5	25	0.5	2	13.5	4
	0.85	20	0.15	15	19.25	0.85	25	0.15	2	21.55	-2.3
	1	20	0	15	20	1	25	0	2	25	-5
Timing		3 months					6 months				
IV	0.15	12	0.85	7	7.75	0.15	22	0.85	0	3.3	4.45
	0.3	12	0.7	7	8.5	0.3	22	0.7	0	6.6	1.9
	0.5	12	0.5	7	9.5	0.5	22	0.5	0	11	-1.5
	0.85	12	0.15	7	11.25	0.85	22	0.15	0	18.7	-7.45
	1	12	0	7	12	1	22	0	0	22	-10

Experiment in the LISS Panel

- LISS panel: Longitudinal Internet Survey of the Social Sciences

- Managed by CentERdata at Tilburg University

- Based upon a probability sample of Dutch households

- Also covers households without Internet access

- Monthly surveys on a variety of topics

- Rich background data collected annually (e.g. wealth, wealth composition)

- 3671 LISS panel members were invited (all living with a partner)

- 3012 panel members participated in the experiment

- 3007 finished the experiment

- Final sample: 2825 individuals, with 1188 complete couples

CARA Utility function:

$$U(\gamma, z) = \frac{1}{\gamma}(1 - e^{-\gamma z})$$

Discounting factor:

$$D(\beta, r) = \beta e^{-rt}$$

Discounted expected utility function:

$$DEU = D(\beta, r) * U(\gamma)$$

choose lottery B if:

$$DEU^B + \tau \varepsilon_B > DEU^A + \tau \varepsilon_A$$

Random Coefficients Model for the Experimental Decisions

- The parameter β for hyperbolic discounting is replaced by 1 if payment is after 0 months

- We estimated models allowing for different values of β but this did not work well. Our preferred specification sets β to 1

- The parameters γ, r and τ are treated as random coefficients

- γ, $\ln(r)$ and $\ln(\tau)$ are modeled as linear functions of individual characteristics and an unobserved component

- The three unobserved components are 3-variate normal with correlations and variances to be estimated

- The model is estimated using Simulated Maximum Likelihood

- The parameter estimates and each individual's decisions are used to predict each individual's values of the three parameters (as posterior means)
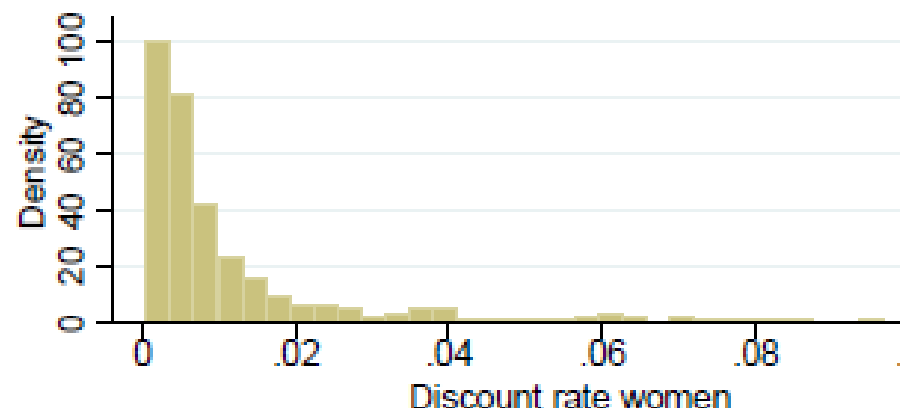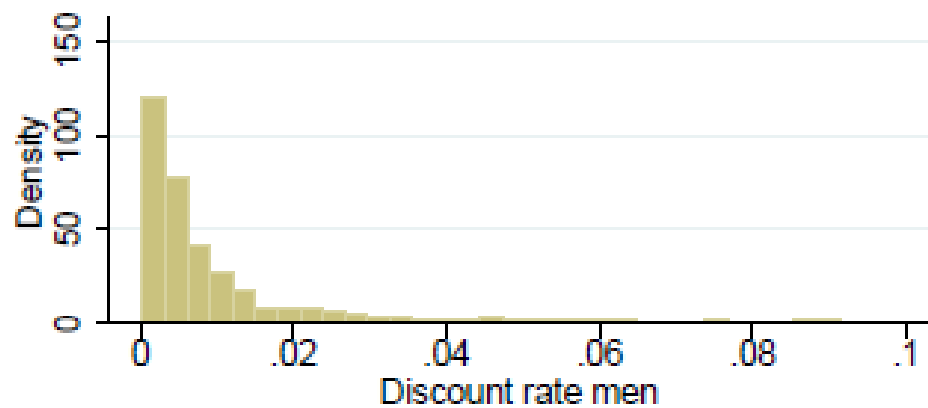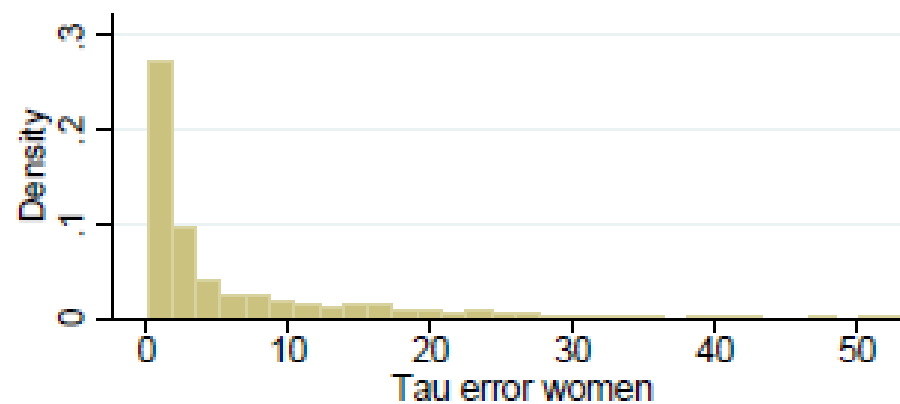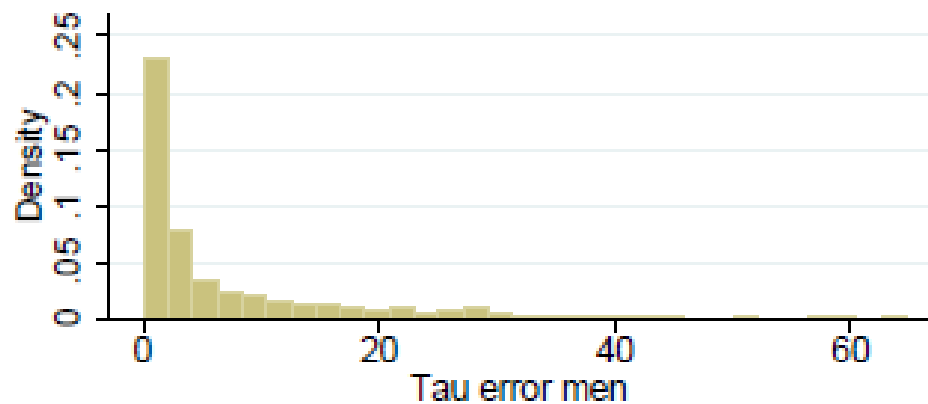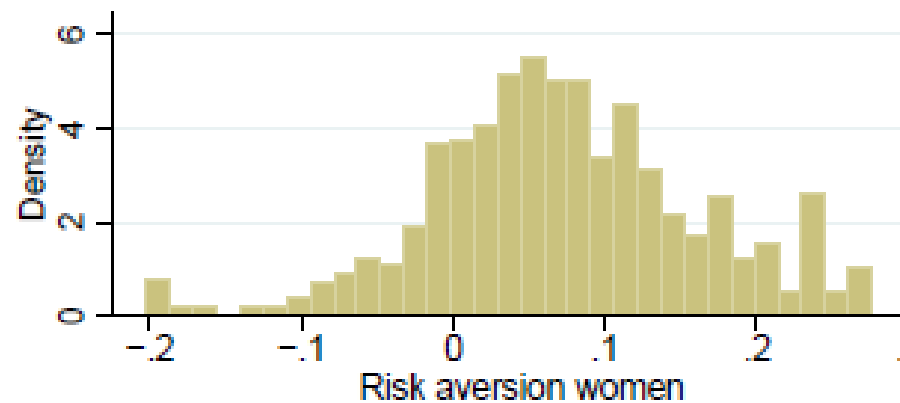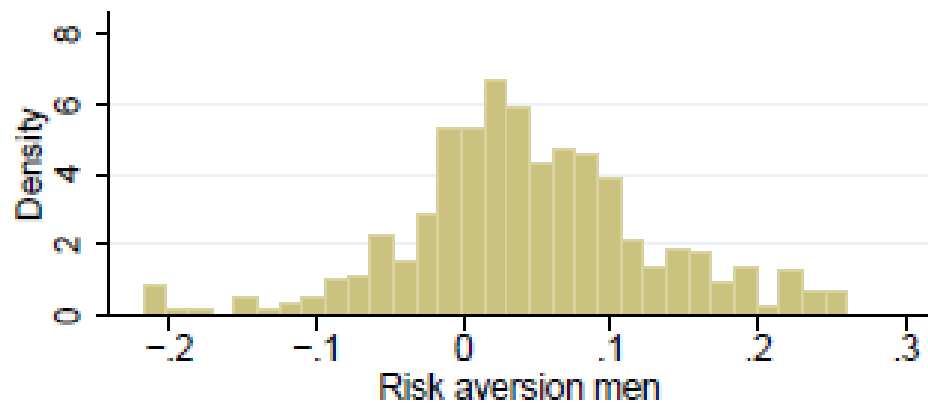
Stated (qualitative) measures of risk and time preferences:

Based upon two survey questions:

Risk aversion:

How would you rate your willingness to take risks concerning financial matters? 1 (not at all willing to take risks), ..., 10 (very willing to take risks)

Time preference:

How much do you agree with the following: If I get money I tend to spend it too quickly. 0 (not at all), ..., 10 (completely)

Experimental and stated measures

Table 2: Individual Specific Parameters

(a) Husband			(b) Wife		
Variable	**Mean**	**Std. Dev.**	**Variable**	**Mean**	**Std. Dev.**
Risk aversion	0.045	0.085	Risk aversion	0.072	0.089
Error	6.385	9.206	Error	5.459	7.756
Time preference	0.136	0.738	Time preference	0.21	0.979
Risk stated	3.684	2.330	Risk stated	2.762	2.163
Impatience money	3.479	2.489	Impatience money	3.65	2.540
N		1408	N		1413

Table 3: Correlations between spouses

(a)	experimental measures			(b)	stated measures	
woman		*man*			*man*	
	risk aversion	impatience	error prop.		risk aversion	impatience
risk aversion	0.0807	-0.0086	-0.0375		0.2211	0.0719
	(0.0054)	(0.7665)	(0.1967)		(0.0000)	(0.0131)
impatience	0.0515	-0.0006	0.0401		0.091	0.1959
	(0.0763)	(0.9822)	(0.1668)		(0.0017)	(0.0000)
error prop.	-0.012	0.0479	0.1538			
	(0.6799)	(0.0988)	(0.0000)			

Notes: Correlation coefficients between measures for men and women; (a) experimental measures and (b) stated preferences. p-value in parentheses.

Table A.6: Correlation of preferences and duration of partnership

men	risk aversion			impatience	
women	dur < 26	dur > 26		dur < 26	dur > 26
risk aversion	0.0657	0.0823	impatience	-0.0172	-0.0030
pval	0.1245	0.0422	*pval*	0.6872	0.9405
obs	548	609	*obs*	548	609
men	risk stated			impatience stat.	
women	dur < 26	dur > 26		dur < 26	dur > 26
risk stated	0.1905	0.2447	impatience stat.	0.1719	0.1770
pval	0.0000	0.0000	*pval*	0.0001	0.0000
obs	548	609	*obs*	548	609

Notes: Correlation coefficients are displayed with corresponding p-values and number of observations. There are 31 observations for people with marriage duration = 26 years.

Measures for intra-household bargaining power

Stated decision making weight (DM):

Here are five descriptions of how financial decisions may be taken in a household. Which of these best describes how financial decisions are taken in your household?

1. my partner generally takes all the decisions concerning financial affairs

2. my partner decides about financial affairs more often than I do

3. my partner and I generally decide together about financial affairs

4. I generally decide about financial affairs more often than my partner

5. I generally take all the decisions about financial affairs

Answers of both partners are combined to construct "weights" for man and woman (DM weight)

NB: 66% reports shared decision making (answer 3)

Income weight: $w(m) = income(m)/(income(m)+income(f))$, etc.

Weights for women

Average Stated
DM weight:
Men: 0.52;
women: 0.48

Average income
weight:
Men: 0.70;
women: 0.30
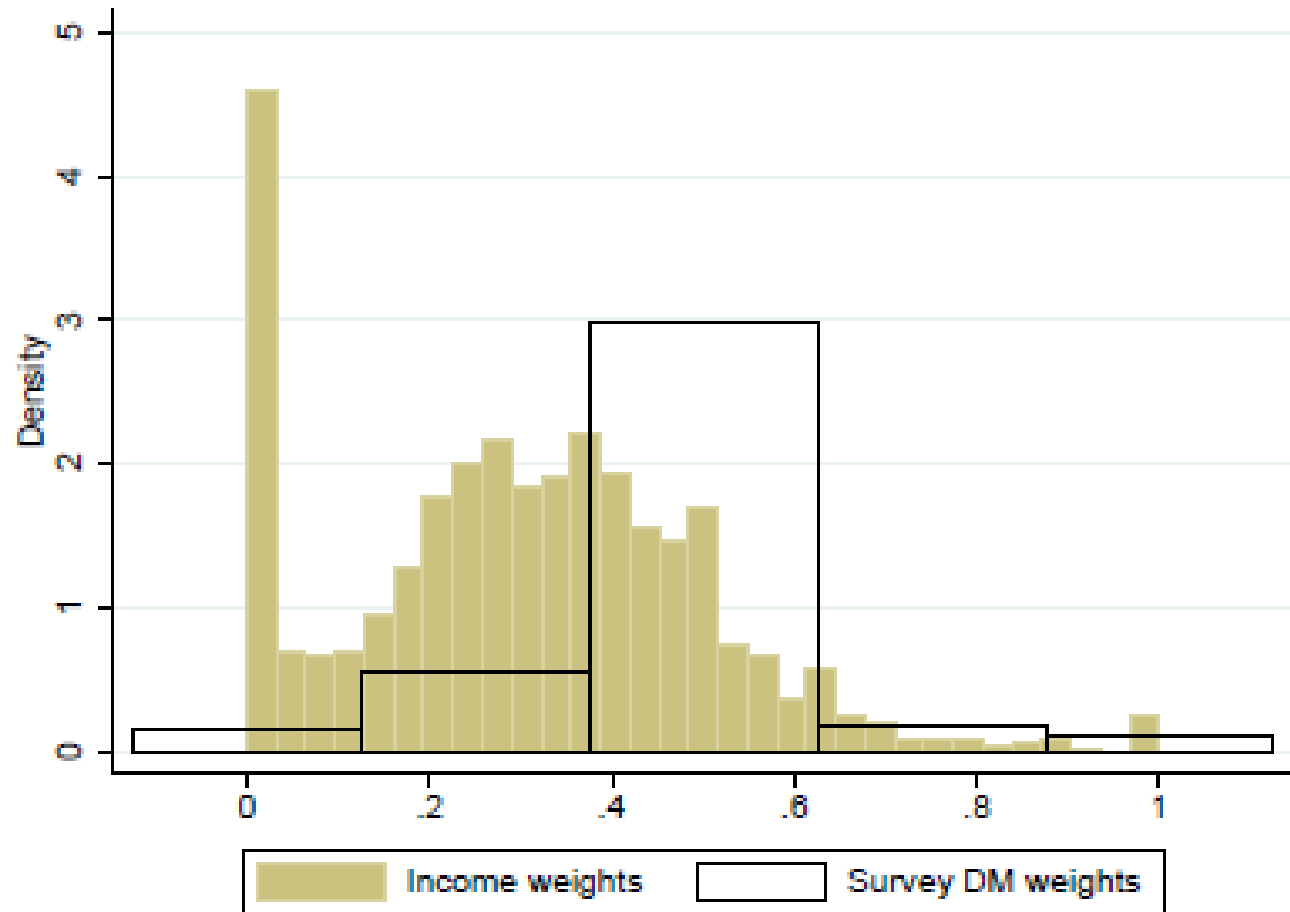
(b) Women

Household decision to invest in risky assets or not (probit model)

$$y_i^* = X_i^f \delta_f + X_i^h \delta_h + X_i^w \delta_w + w_i^h \gamma_{i,j}^h \mu_h + w_i^w \gamma_{i,j}^w \mu_w +$$
$$w_i^h r_{i,j}^h \mu_h + w_i^w r_{i,j}^w \mu_w +$$
$$w_i^h \tau_{i,j}^h \mu_h + w_i^w \tau_{i,j}^w \mu_w + \epsilon_i$$

$$Y_i = \begin{cases} 0 & \text{if} \quad y_i^* \leq 0 \quad \text{(does not own risky financial assets)}, \\ 1 & \text{if} \quad y_i^* > 0 \quad \text{(owns risky financial assets)}. \end{cases}$$

Table 5: Probit estimations of household investments in risky assets

	(1) no weights	(2) income w	(3) stated w	(4) no weights	(5) income w	(6) stated w
Men						
Risk aversion	-1.240*	-2.452**	-1.546	-1.296*	-2.323**	-1.546
	(0.742)	(1.019)	(1.321)	(0.709)	(0.965)	(1.321)
Error propensity	-0.016**	-0.021**	-0.020	-0.016**	-0.022**	-0.020
	(0.008)	(0.011)	(0.013)	(0.007)	(0.010)	(0.013)
Impatience	-0.038	-0.076	-0.073	-0.059	-0.097	-0.073
	(0.083)	(0.092)	(0.180)	(0.084)	(0.096)	(0.180)
Women						
Risk aversion	-0.331	0.460	-2.372*	-0.788	-1.924	-2.372*
	(0.708)	(1.897)	(1.300)	(0.655)	(1.776)	(1.300)
Error propensity	-0.009	-0.016	-0.039**	-0.011	-0.027	-0.039**
	(0.009)	(0.026)	(0.018)	(0.008)	(0.024)	(0.018)
Impatience	-0.052	-0.453	-0.113	-0.074	-0.540**	-0.112
	(0.070)	(0.293)	(0.140)	(0.070)	(0.272)	(0.140)
Loglikelihood	-405.4	-404.3	-404.6	-492.1	-490.9	-404.6
Observations	886	886	886	1,069	1,067	888

Table A.8: Household investments and stated preferences

hhinv	(1) unweighted	(2) income w	(3) stated w
Men			
Risk stated	0.109***	0.148***	0.219***
	(0.024)	(0.032)	(0.040)
Impatience	-0.066***	-0.110***	-0.102**
	(0.024)	(0.034)	(0.045)
Women			
Risk stated	0.046*	0.172**	0.083*
	(0.025)	(0.068)	(0.047)
Impatience	-0.021	0.018	-0.067
	(0.024)	(0.063)	(0.045)
Loglikelihood	-2532	-2488	-2487
Controls	Yes	Yes	Yes
Observations	935	935	935

Notes: Preferences for risk and patience are measured according to the survey questionnaire.

Table 6: Tobit estimations of household financial wealth

	(1)	(2)	(3)	(4)	(5)	(6)
Log savings	unweighted	income w	stated w	unweighted	income w	stated w
Men						
Risk aversion	-7.978***	-10.309***	-11.092**	-5.266**	-4.864	-11.806**
	(2.689)	(3.624)	(4.875)	(2.602)	(3.489)	(4.879)
Error prop.	-0.096***	-0.119***	-0.148***	-0.086***	-0.088**	-0.153***
	(0.027)	(0.036)	(0.049)	(0.026)	(0.034)	(0.049)
Impatience	-1.115***	-1.408***	-2.149***	-1.132***	-1.400***	-2.166***
	(0.267)	(0.327)	(0.554)	(0.278)	(0.342)	(0.556)
Women						
Risk aversion	-2.130	3.765	-9.385**	-3.772	-4.691	-9.536**
	(2.519)	(6.750)	(4.492)	(2.455)	(6.334)	(4.503)
Error prop.	-0.024	-0.103	-0.107*	-0.048	-0.221***	-0.104*
	(0.030)	(0.081)	(0.055)	(0.030)	(0.080)	(0.055)
Impatience	-0.416**	-0.969	-0.997**	-0.383**	-1.013	-0.938**
	(0.189)	(0.720)	(0.389)	(0.182)	(0.677)	(0.389)
Loglikelihood	-2307.06	-2307.07	-2307.99	-2753.39	-2748.56	-2313.78
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	872	872	872	1,047	1,045	874

Table A.10: Household savings choices and stated preferences

Log savings	(1) unweighted	(2) income w	(3) stated w
Men			
Risk stated	0.062	0.042	0.225
	(0.084)	(0.109)	(0.146)
Impatience	-0.156**	-0.217**	-0.248*
	(0.077)	(0.104)	(0.146)
Women			
Risk stated	-0.078	0.035	-0.312*
	(0.090)	(0.244)	(0.168)
Impatience	0.036	-0.079	-0.041
	(0.078)	(0.204)	(0.144)
Controls	Yes	Yes	Yes
Observations	905	905	905

Notes: Tobit regression of the natural logarithm of financial wealth at the household level. Explanatory variables are stated risk taking and impatience. We control for age category dummies, education level dummies and log gross individual income.

Conclusions

- Experimental measures of risk aversion, time preference, and error propensity in couples

- Stated survey measures of risk aversion and time preference in couples

- Correlations within couple are larger for the stated measures than for the experimental measures

- Correlations are slightly larger for partnerships of longer duration

- The measures experimental as well as the survey measures help to predict ownership of risky assets and household financial wealth

- Weighting with an index of household bargaining power does not lead to substantial improvement of the prediction power