

CAN ESTIMATED RISK AND TIME PREFERENCES EXPLAIN REAL-LIFE FINANCIAL CHOICES?

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PREFERENCES AND CHOICES

▶ **What we know:**

- ▶ Small lab samples, short horizons, low stakes, general context (e.g. Andreoni and Sprenger, 2012; Andersen et al., 2014)
- ▶ Correlations between preferences and personal traits (e.g. Bütler and Teppa, 2007; Chabris et al., 2008; Tanaka et al., 2010; Dohmen et al., 2011; Falk et al., 2018)

▶ **What we don't know:**

- (1) Risk and time preferences in a large-scale non-student sample with delays of multiple years in a high-stakes real-life context
- (2) Relation between structurally estimated preferences and **actual** financial decision making

WHAT WE DO

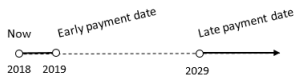
- ▶ We **estimate risk and time preferences simultaneously** with Convex Time Budgets (**Andreoni and Sprenger, 2012**)
 - (1) How do our preference estimates compare to the literature?
Realistic context, large stakes of €10.000 and horizons up to 10 years for 1110 pension fund participants
- ▶ We use a **unique micro dataset** from a Dutch pension fund to relate estimated preferences to **actual financial decision making** using a life-cycle model
 - (2) Can we explain actual chosen payment schemes (flat v.s. flexible) with the estimated preferences?
 - (3) What are the welfare implications of freedom of choice (flexibility in payment schemes)?

WHAT WE FIND

- (1) **Preferences:** present-bias factor $\beta = 0.88$, discount factor $\delta = 0.96$, CRRA curvature $\alpha = 0.97$
⇒ Actives more present biased than retirees, 23% future biased
- (2) **Explaining choices:** estimated preferences explain actual chosen payment schemes (flat v.s. flexible) up to 83% of our sample
- (3) **Welfare analysis:** freedom of choice (i.e. flexibility) creates annual *potential* welfare gains up to 4.8%, but *realized* welfare gains are lower or even negative
⇒ Gains cluster at higher incomes, and at lower life expectancies

EXPERIMENTAL DESIGN: CONVEX TIME BUDGETS

Amount to divide: €10.000,-
 Early payment date: 2019
 Late payment date: 2029



Allocate now in the next five scenarios how much of the €10.000,- you want to allocate to the early payment date. Round to whole euros. The remaining amount is filled in automatically for the late payment date.

Pay attention:

- The **probability of payment** is within these five scenarios always the same but it is increased to 100%.
- The **interest rate** increases per scenario.
- Fill in for each of the five scenarios how you want to divide €10.000,-**

	Early payment date	Late payment date
	The amount you receive at the early payment date:	Amount you receive in 2029 with 100% probability:
Scenario 16: suppose that per paid euro in 2029 you receive €0,00 additionally	<input type="text" value="10000"/>	€0 x 1.00 = €0
Scenario 17: suppose that per paid euro in 2029 you receive €0,05 additionally	<input type="text" value="9500"/>	€500 x 1.05 = €525
Scenario 18: suppose that per paid euro in 2029 you receive €0,17 additionally	<input type="text" value="8000"/>	€2000 x 1.17 = €2340
Scenario 19: suppose that per paid euro in 2029 you receive €0,36 additionally	<input type="text" value="2000"/>	€8000 x 1.36 = €10880
Scenario 20: suppose that per paid euro in 2029 you receive €0,59 additionally	<input type="text" value="0"/>	€10000 x 1.59 = €15900

EXPERIMENTAL DESIGN: PRESENT BIAS

- ▶ To identify present bias, we implement a scenario from the INTRA (International Test of Risk Attitudes) study, University of Zurich — adapted version of **Frederick (2005)**

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

A. Receive €800 now,

B. Receive € x next year.

- ▶ In total, we use **21 decisions** to estimate preferences simultaneously at individual level. Assumptions:
 - ▶ Quasi-hyperbolic discounting
(**Phelps and Pollak, 1968; Laibson, 1997**)
 - ▶ Power utility function: $U(x; \alpha) = \frac{x^\alpha}{\alpha}$

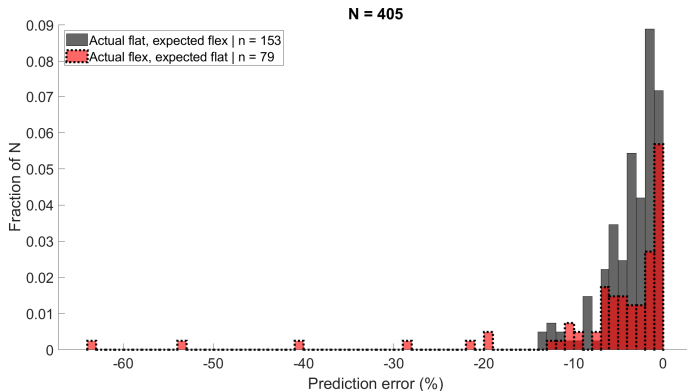
TWO-LIMIT TOBIT (MLE): PARAMETERS

	Median	Mean	Standard Deviation	25th Percentile	75th Percentile
<i>All</i>					
Present bias $\hat{\beta}$	0.878	0.868	0.237	0.719	0.989
Discount factor $\hat{\delta}$	0.962	0.967	0.172	0.921	1.016
CRRA curvature $\hat{\alpha}$	0.966	0.938	0.132	0.910	0.985
<i>Actives</i>					
Present bias $\hat{\beta}$	0.855	0.850	0.235	0.696	0.981
Discount factor $\hat{\delta}$	0.963	0.970	0.168	0.922	1.017
CRRA curvature $\hat{\alpha}$	0.966	0.943	0.127	0.912	0.985
<i>Retirees</i>					
Present bias $\hat{\beta}$	0.911	0.899	0.237	0.776	1.005
Discount factor $\hat{\delta}$	0.962	0.963	0.180	0.917	1.014
CRRA curvature $\hat{\alpha}$	0.966	0.930	0.140	0.906	0.984

RETIREMENT CHOICES & WELFARE

- ▶ **Real-life retirement choice:** flat or flexible annuity payments
- ▶ How large is the difference between the actual real-life (*act*) and the expected utility (*exp*) choice?
 - ▶ Prediction error ε
- ▶ **Welfare analysis:** set $\hat{\beta}_i = 1$ (Ericson and Laibson, 2019)
⇒ Potential and realized welfare effects

CAN WE EXPLAIN RETIREMENT CHOICES?



Successful explanation:

	Prediction error ε interval (%)						
	0	[-1, 0)	[-2, -1)	[-3, -2)	[-4, -3)	[-5, -4)	$(-\infty, -5)$
Cumulative fraction	42.72%	55.56%	67.16%	72.59%	79.26%	83.21%	100.00%

WELFARE EFFECTS (AGGREGATE LEVEL)

Potential welfare gains possible, but only partially realized





	Several samples based on prediction error ε interval (%)						
	0	[-1, 0]	[-2, 0]	[-3, 0]	[-4, 0]	[-5, 0]	$(-\infty, 0]$
Panel A: Potential welfare							
Mean	4.79	3.73	2.99	2.90	2.91	3.00	3.87
Median	2.53	1.98	1.75	1.76	1.85	2.01	2.52
Std. Dev.	6.01	4.70	3.57	3.30	3.12	3.13	4.01
5% perc.	0.31	0.27	1.00	1.44	2.24	2.68	7.61
95% perc.	16.62	12.89	9.21	8.07	6.99	6.59	5.43
Panel B: Realized welfare							
Mean	1.70	1.25	0.98	0.86	0.73	0.62	-0.48
Median	0.89	0.64	0.47	0.42	0.35	0.24	-0.14
Std. Dev.	2.17	1.76	1.52	1.45	1.40	1.40	3.19
5% perc.	0.07	-0.16	-0.29	-0.35	-0.59	-0.76	-4.83
95% perc.	5.96	4.67	3.90	3.61	3.30	3.14	2.60

Median annual potential welfare gain €6,184, realized €1,691 only






CONCLUSIONS

- ▶ We **estimate preferences simultaneously** in a non-student sample with long horizons in a realistic context
 - (1) Present-bias factor $\beta = 0.88$, annual discount factor $\delta = 0.96$, utility curvature $\alpha = 0.97$
 - ⇒ Comparable with previous literature
 - ⇒ Actives more present biased than retirees
- ▶ We relate estimated preferences to **actual financial choices**
 - (2) Explain up to 83% of choices in our sample (with error $\varepsilon = 5\%$)
 - (3) Freedom of choice (i.e. flexibility) creates potential welfare gains, which are only partially realized
 - ⇒ Gains cluster at higher incomes, and at lower life expectancies



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