

Individual Preferences Over Risk and Portfolio Choice

Hans-Martin von Gaudecker

Universität Bonn

Arthur van Soest

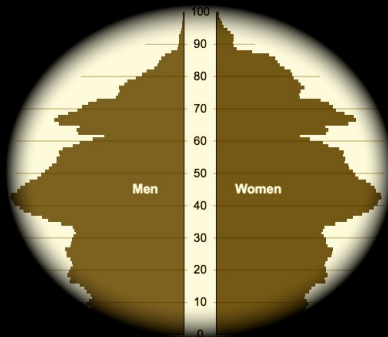
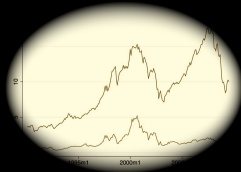
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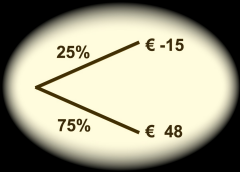
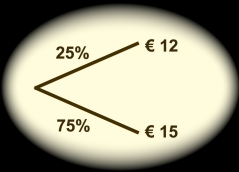
Erik Wengström

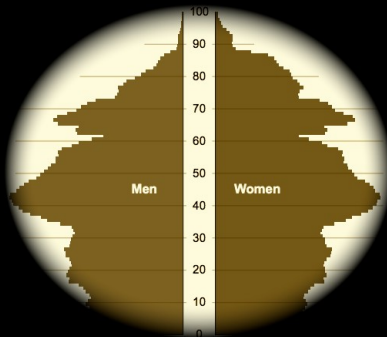
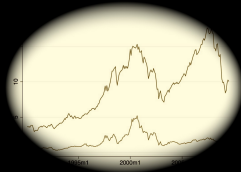
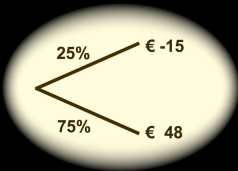
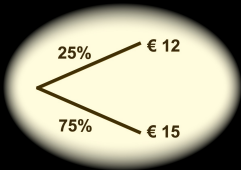
Lund University

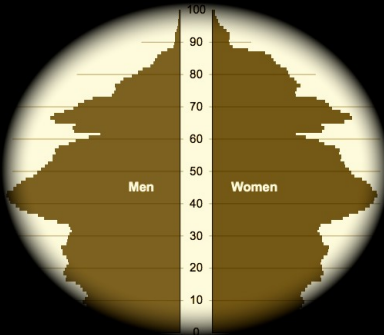
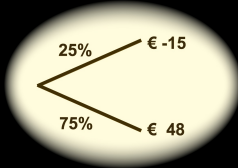
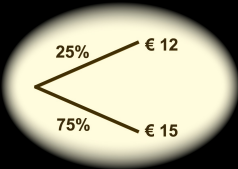
ECB Conference on Household Finance and Consumption

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Theoretical specification

Psychological foundations

Utility formulation

Data

CentERpanel

Our experiment

Descriptives

Empirics

Specification

Exemplatory results

Discussion

Narrow framing: Psychological foundations

	PERCEPTION	INTUITION	REASONING
PROCESS	Fast Parallel Automatic Effortless Associative Slow-learning Emotional		Slow Serial Controlled Effortful Rule-governed Flexible Neutral
CONTENT	Percepts Current stimulation Stimulus-bound	Conceptual representations Past, Present and Future Can be evoked by language	

Source: Kahneman, AER 2003.

Narrow framing: Psychological foundations

**Utility attached
to consumption states.**

Merge all risks.

**Implies risk-neutral
behaviour in experiments.**

INTUITION

**Fast
Parallel
Automatic
Effortless
Associative
Slow-learning
Emotional**

REASONING

**Slow
Serial
Controlled
Effortful
Rule-governed
Flexible
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**Conceptual representations
Past, Present and Future
Can be evoked by language**

Narrow framing: Psychological foundations

Utility attached to consumption states.

Merge all risks.

Implies risk-neutral behaviour in experiments.

Utility attached to changes in accessible outcomes.

Evaluate risks in isolation.

(Stronger) risk aversion in experiments, stock market.

INTUITION

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Parallel
Automatic
Effortless
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Emotional**

REASONING

**Slow
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Controlled
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**Conceptual representations
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Utility from consumption **and** narrowly framed asset returns

- ▶ Evolution of wealth

$$\tilde{W}_{t+1} = (W_t - C_t) \sum_{\ell \in \mathcal{L}} \theta_{\ell,t} \tilde{R}_{\ell,t+1}.$$

Utility from consumption **and** narrowly framed asset returns

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$$\tilde{W}_{t+1} = (W_t - C_t) \sum_{\ell \in \mathcal{L}} \theta_{\ell,t} \tilde{R}_{\ell,t+1}.$$

- ▶ Start from standard recursive utility

$$V_t = \left((1 - \beta) C_t^{1-\rho} + \beta x^{1-\rho} \right)^{\frac{1}{1-\rho}}$$

$$x = \mu(\tilde{V}_{t+1} | I_t)$$

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$$V_t = \left((1 - \beta) C_t^{1-\rho} + \beta x^{1-\rho} \right)^{\frac{1}{1-\rho}}$$

- ▶ Add narrow framing component

$$x = \mu(\tilde{V}_{t+1} | I_t) + b_0 \sum_{m \in \mathfrak{M}} \nu(\tilde{G}_{m,t+1})$$

where $\mathfrak{M} \subset \mathcal{L}$ and $\tilde{G}_{m,t+1} = \theta_{m,t}(\tilde{R}_{m,t+1} - R_f)$

Utility from consumption **and** narrowly framed asset returns

- ▶ Standard specification for $\mu(\cdot)$

$$\mu(\tilde{z}) = (\mathbb{E} [(\tilde{z})^{1-\gamma}])^{\frac{1}{1-\gamma}}, \quad 0 < \gamma \neq 1.$$

Utility from consumption **and** narrowly framed asset returns

- ▶ Standard specification for $\mu(\cdot)$

$$\mu(\tilde{z}) = \left(\mathbb{E} [(\tilde{z})^{1-\gamma}] \right)^{\frac{1}{1-\gamma}}, \quad 0 < \gamma \neq 1.$$

- ▶ CE of kinked linear function for $\nu(\cdot)$

$$\nu(\tilde{G}_{m,t+1}) = \nu^{-1} \left(\mathbb{E} \left[\nu(\tilde{G}_{m,t+1}) \right] \right),$$

$$\nu(z) = \begin{cases} z & \text{for } z \geq 0 \\ \lambda z & \text{for } z < 0 \end{cases}$$

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Data: The CentERpanel

- ▶ Dutch panel of about 2000 households
- ▶ Respondents answer questions via Internet or TV
- ▶ Wealth of background characteristics

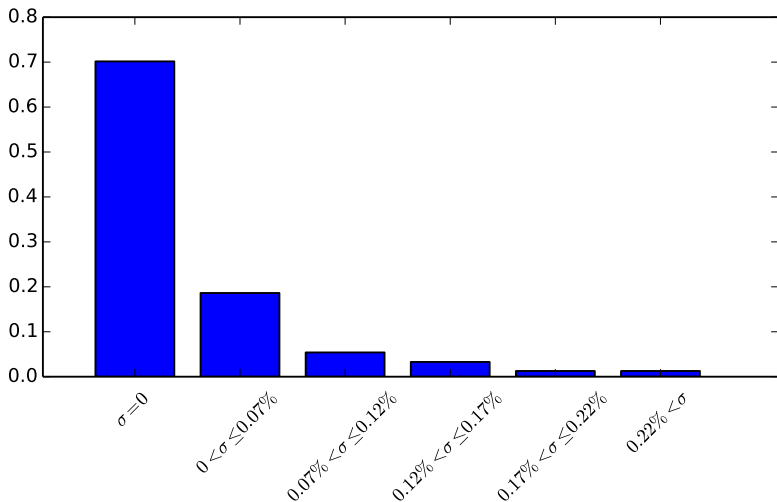
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- ▶ Extremely detailed data on individual portfolios
- ▶ 945 financial deciders of households with portfolio information in our experiment

Distribution of risky asset shares











Note: σ denotes the annual standard deviation of households' portfolios, taken from Gaudecker (JF forthcoming)

Screenshot of typical set of choices

Progress:  70% [Instructions](#) [Help](#)

Please, make a choice between A and B for each of the decision problems below.

Option A -outcome IMMEDIATELY revealed	Option B -outcome revealed in THREE MONTHS	Choice
		A B
 € 21 with probability 25% € 18 with probability 75%	 € 54 with probability 25% € -9 with probability 75%	<input type="radio"/> <input type="radio"/>
 € 21 with probability 50% € 18 with probability 50%	 € 54 with probability 50% € -9 with probability 50%	<input type="radio"/> <input type="radio"/>
 € 21 with probability 75% € 18 with probability 25%	 € 54 with probability 75% € -9 with probability 25%	<input type="radio"/> <input type="radio"/>
 € 21 with probability 100% € 18 with probability 0%	 € 54 with probability 100% € -9 with probability 0%	<input type="radio"/> <input type="radio"/>

Progress:  70%

[Instructions](#)

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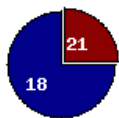
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Option A
-outcome IMMEDIATELY revealed

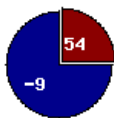
Option B
-outcome revealed in THREE MONTHS

Choice

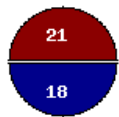
A B



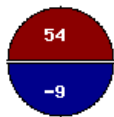
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€ -9 with probability 75%



€ 21 with probability 50%
€ 18 with probability 50%



€ 54 with probability 50%
€ -9 with probability 50%

Payoffs from the seven lotteries

Lottery Set	Option A		Option B	
	Low	High	Low	High
	Payoff	Payoff	Payoff	Payoff
1	27	33	0	69
2	39	48	9	87
3	12	15	-15	48
4	33	36	6	69
5	18	21	-9	54
6	24	27	-3	60
7	15	18	-12	51

Correlation(portfolio risk, safe experimental choices) < 0

Tobit regression

Number of obs = 944
 LR chi2(7) = 138.45
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.0484

Log likelihood = -1362.4185

Portfolio	Std.Dev.	Coef.	Std. Err.	t	P> t	[95% Conf. Int.]	
Switchpoint		-0.068	0.028	-2.39	0.017	-0.125	-0.012
Educ: Vocational		2.675	1.129	2.37	0.018	0.459	4.891
Educ: University		4.150	1.379	3.01	0.003	1.443	6.857
Age 36-50		8.654	1.788	4.84	0.000	5.145	12.16
Age 51-65		7.341	1.785	4.11	0.000	3.836	10.84
Age 66+		10.29	1.914	5.38	0.000	6.533	14.04
log(Total Assets)		2.955	0.429	6.87	0.000	2.111	3.799
Constant		-46.21	5.802	-7.96	0.000	-57.59	-34.82

/sigma	11.64	0.55				10.56	12.72
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Obs. summary: 662 left-censored observations at sd<=0
 282 uncensored observations

Correlation(portfolio risk, small-stake struct. param's) < 0

Tobit regression Number of obs = 825
LR chi2(8) = 124.22
Prob > chi2 = 0.0000
Log likelihood = -1230.2173 Pseudo R2 = 0.0481

Portfolio Std.Dev.	Coef.	Std. Err.	t	P> t	[95% Conf. Int.]	
Small St. Risk Av	-15.11	6.662	-2.27	0.024	-28.19	-2.039
Errors in Exper.	-4.759	2.770	-1.72	0.086	-10.19	0.679
Educ: Vocational	2.030	1.179	1.72	0.085	-0.283	4.345
Educ: University	3.565	1.425	2.50	0.013	0.768	6.363
Age 36-50	8.021	1.837	4.37	0.000	4.415	11.62
Age 51-65	6.598	1.830	3.60	0.000	3.004	10.19
Age 66+	10.28	1.969	5.22	0.000	6.423	14.15
log(Total Assets)	3.015	0.467	6.46	0.000	2.098	3.932
Constant	-48.46	5.941	-8.16	0.000	-60.12	-36.79

/sigma	11.38	0.55			10.28	12.48

Obs. summary: 567 left-censored observations at sd<=0
 258 uncensored observations

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Empirical specification

- ▶ Discretised choice between safe and risky asset

$$\theta_{\text{risky}} \in \Theta_{\text{risky}} = \{0, 0.2, 0.4, 0.6, 0.8, 1\}$$

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$$\theta_{\text{risky}} \in \Theta_{\text{risky}} = \{0, 0.2, 0.4, 0.6, 0.8, 1\}$$

- ▶ Stochastic utility

$$\mathcal{V}(\theta_i, \cdot) = V(\theta_i, \cdot) + \tau_\theta \cdot W_i \cdot \varepsilon_\theta$$

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$$\mathcal{V}(\theta_i, \cdot) = V(\theta_i, \cdot) + \tau_\theta \cdot W_i \cdot \varepsilon_\theta$$

- ▶ Logit choice probabilities $\mathbb{P}(\theta_i)$ with nonlinear index

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- ▶ Similarly for the experimental choices

$$\mathcal{V}_\pi(\theta_i, \tilde{\pi}_{i,j}, \cdot) = V_\pi(\theta_i, \tilde{\pi}_{i,j}, \cdot) + \tau_\pi \cdot \varepsilon_\pi$$

Likelihood

- ▶ Conditional on preference type k

$$\mathcal{L}_{i,k} = \mathbb{P} \left(\theta_i^{\text{obs}}, \cdot \right) \prod_{j \in \mathfrak{J}_i} \mathbb{P} \left(\tilde{\pi}_{ij}^{\text{obs}}, \cdot \right)$$

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- ▶ Individual likelihood

$$\mathcal{L}_i = \sum_{k \in \mathfrak{K}} w(X_i, \eta_k) \cdot \mathcal{L}_{i,k}$$

with $w(X_i, \eta_k) = \Lambda(X_i \eta_k)$

Results

Discussion

- ▶ Structurally connected risk preference parameters estimated from experimental data with real-world portfolio choices

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- ▶ Central ingredients
 - ▶ First order risk aversion
 - ▶ Narrow framing

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- ▶ Central ingredients
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- ▶ First estimates are plausible in magnitude
- ▶ Advantage of estimated structural parameters: Quantitatively meaningful and transportable to a variety of settings

