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Risk attitudes of farmers, foresters and students:

An experimental multimethod comparison

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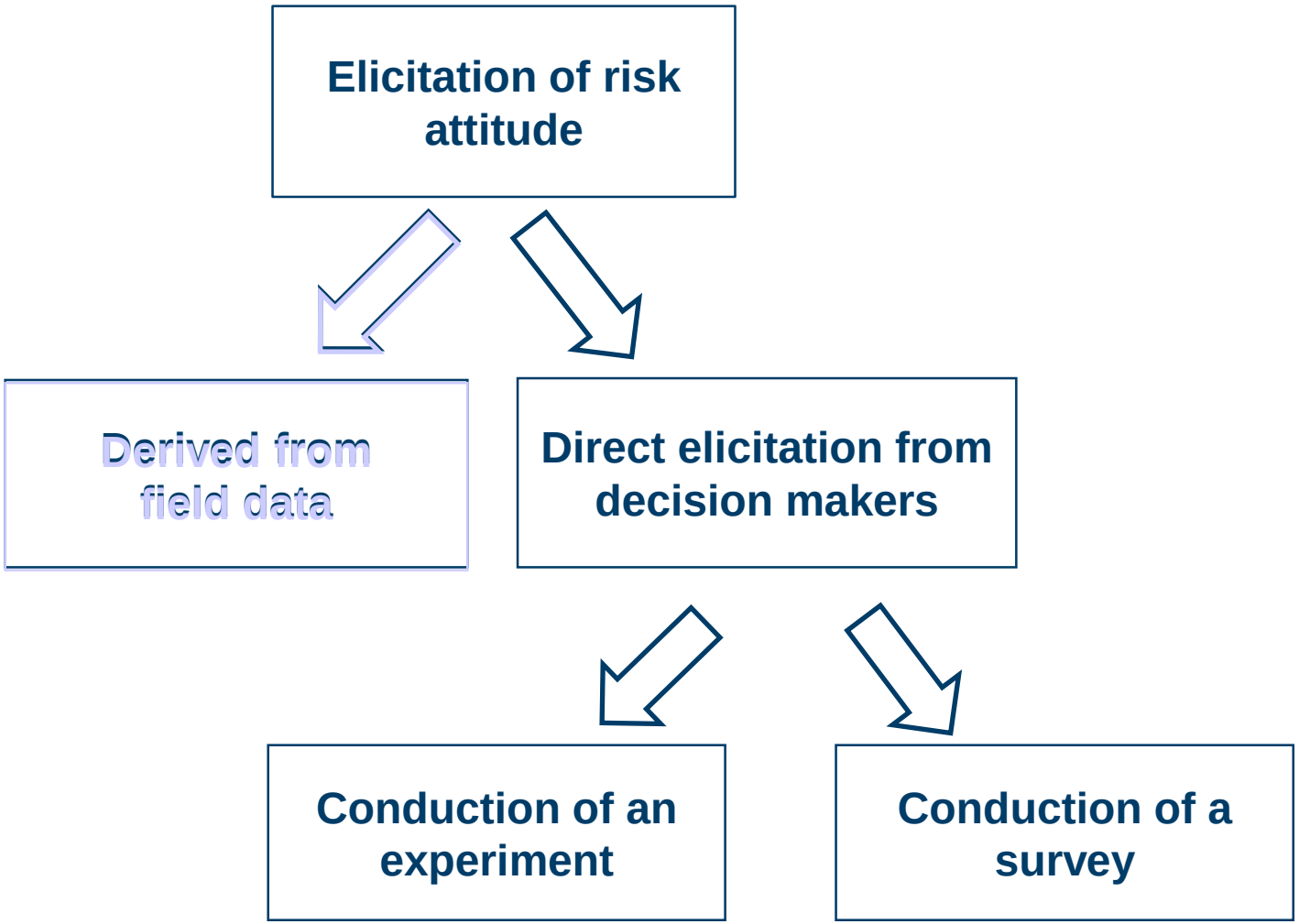
Importance of the risk attitude for agricultural decisions

Importance of the risk attitude for forestry decisions

Two principle ways for elicitating the risk attitude



Soruces: z.B. Eswaran and Kotwal 1990, Anderson and Mellor 2008, Lönnqvist et al. 2011, Hellerstein et al. 2013

The Holt and Laury (HL) task

Row	Lottery A		Decision	Lottery B		Difference between the expected values[a)]	CRRA values[a)b)]
	Chance to win € 180.00	Chance to win € 144.00		Chance to win € 346.50	Chance to win € 9.00		
2	10%	90%	A ○ ○ B	10%	90%	104.85 €	-2.48 ≤ r≤ -1.71
4	20%	80%	A ○ ○ B	20%	80%	74.70 €	-1.27 ≤ r ≤ -0.95
6	30%	70%	A ○ ○ B	30%	70%	44.55 €	-0.7 ≤ r ≤ -0.49
8	40%	60%	A ○ ○ B	40%	60%	14.40 €	-0.31≤ r ≤ -0.14
10	50%	50%	A ○ ○ B	50%	50%	-15.75 €	-0.01 ≤ r ≤ 0.15
12	60%	40%	A ○ ○ B	60%	40%	-45.90 €	0.28 ≤ r ≤ 0.41
14	70%	30%	A ○ ○ B	70%	30%	-76.05 €	0.54 ≤ r ≤ 0.68
16	80%	20%	A ○ ○ B	80%	20%	-106.20 €	0.82 ≤ r ≤ 0.97
18	90%	10%	A ○ ○ B	90%	10%	-136.35 €	1.15 ≤ r ≤ 1.37
20	100%	0%	A ○ ○ B	100%	0%	-166.50 €	1.68 ≤ r ≤ 2.25

Table 1: HL according to Laury (2012)

[a)] Column is not shown to participants

[b)] Applying a power utility function in the form $u(x)=x^{(1-r)}/(1-r)$

The Eckel and Grossman (EG) task

Row	Payoff A probability 50%	Payoff B probability 50%	Decision	Difference between expected values[a)b)]	CRRA values[a)c)]
1	170.00 €	170.00 €	☐	-41.45 €	r > 1.37
2	136.00 €	216.75 €	☐	-35.07 €	0.97 < r ≤ 1.37
3	102.00 €	272.00 €	☐	-24.45 €	0.68 < r ≤ 0.97
4	68.00 €	332.50 €	☐	-11.20 €	0.41 < r ≤ 0.68
5	51.00 €	365.50 €	☐	-3.20 €	0.15 < r ≤ 0.41
6	34.00 €	388.90 €	☐	0.00 €	-0.15 < r ≤ 0.15
7	25.50 €	394.85 €	☐	-1.27 €	-0.49 < r ≤ -0.15
8	17.00 €	396.95 €	☐	-4.47 €	-0.95 < r ≤ -0.49
9	4.25 €	397.40 €	☐	-10.62 €	r ≤ -0.95

Table 2: EG task according to Reynaud and Couture (2012)

a) Column is not shown to participants

b) The difference is calculated by the expected value of row six minus the expected value of the respective lottery

c) Applying a power utility function in the form $u(x)=x^{(1-r)}/(1-r)$

Self assessment (SA)

How do you see yourself: Are you generally a risk-seeking person or do you try to avoid risks?

Please tick on the scale to the value that corresponds best to your risk attitude

- ☐ **0 – (not at all willing to take risks)**
- ☐ **1**
- ☐ **2**
- ☐ **3**
- ☐ **4**
- ☐ **5 – (risk neutral)**
- ☐ **6**
- ☐ **7**
- ☐ **8**
- ☐ **9**
- ☐ **10 – (very willing to take risks)**

Figure 1: SA according to Dohmen et al. (2011)

Derivation of hypotheses

H1a: The EG task and the HL task result in diverging CRRA values, however, their elicited risk attitudes correlate at all groups.

H1b: The SA does not serve as an adequate surrogate for the HL task.

H2: Measured risk aversion coefficients do not differ significantly between foresters, farmers and forestry students.

Results of the HL task and the EG task correlate

→ **Spearman's rank-order correlation:**

	Farmers	Foresters	Forestry students
HL task / EG task	0.179*	0.203*	0.284**
HL task / SA	0.072	0.115	0.171

Level of significance: *** p<0.001; ** p<0.01; * p<0.05

All methods reveal significant differences of mean values

→ **Wilcoxon signed-rank test (p-values):**

	Farmers	Foresters	Forestry students
HL task / EG task	0.000	0.006	0.001
HL task[a] / SA[a]	0.006	0.007	0.000

[a] Condensed risk classification (three categories: risk-averse, risk-neutral and risk-seeking)

→ **Hypothesis 1a can be supported!**

→ **Hypothesis 1b can be supported!**

Farmers and foresters reveal different risk attitudes

→ Intervall regression on CRRA values:

	HL task	EG task
Constant	0.664**	0.998***
Gender (male: 0; female: 1)	-0.155	0.125
Age (years)	-0.005	-0.007
University degree (no: 0; yes: 1)	0.079	-0.122
Self-employed (no: 0; yes: 1)	0.202.	0.446*
Experience with experiments (no: 0; yes: 1)	-0.051	0.059
Farmer (no: 0; yes: 1)	-0.35*	-0.497*
Student (no: 0; yes: 1)	0.214	0.049

→ Hypothesis 2 can be partially supported!

Conclusions

- Results from self-assessment (questionnaire) and lotteries (experiments) reveal significant differences.
- The EG task and the HL task yield to equivalent results in regressions (correlation), but not with regard to the direct comparison of the CRRA values (comparison of means).
- With regard to the risk attitude, forestry students can be considered as convenience group for forester in future experiments.
- For policies that affect both farmers as well as foresters, differences in their risk attitude should be considered.

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Thank you!

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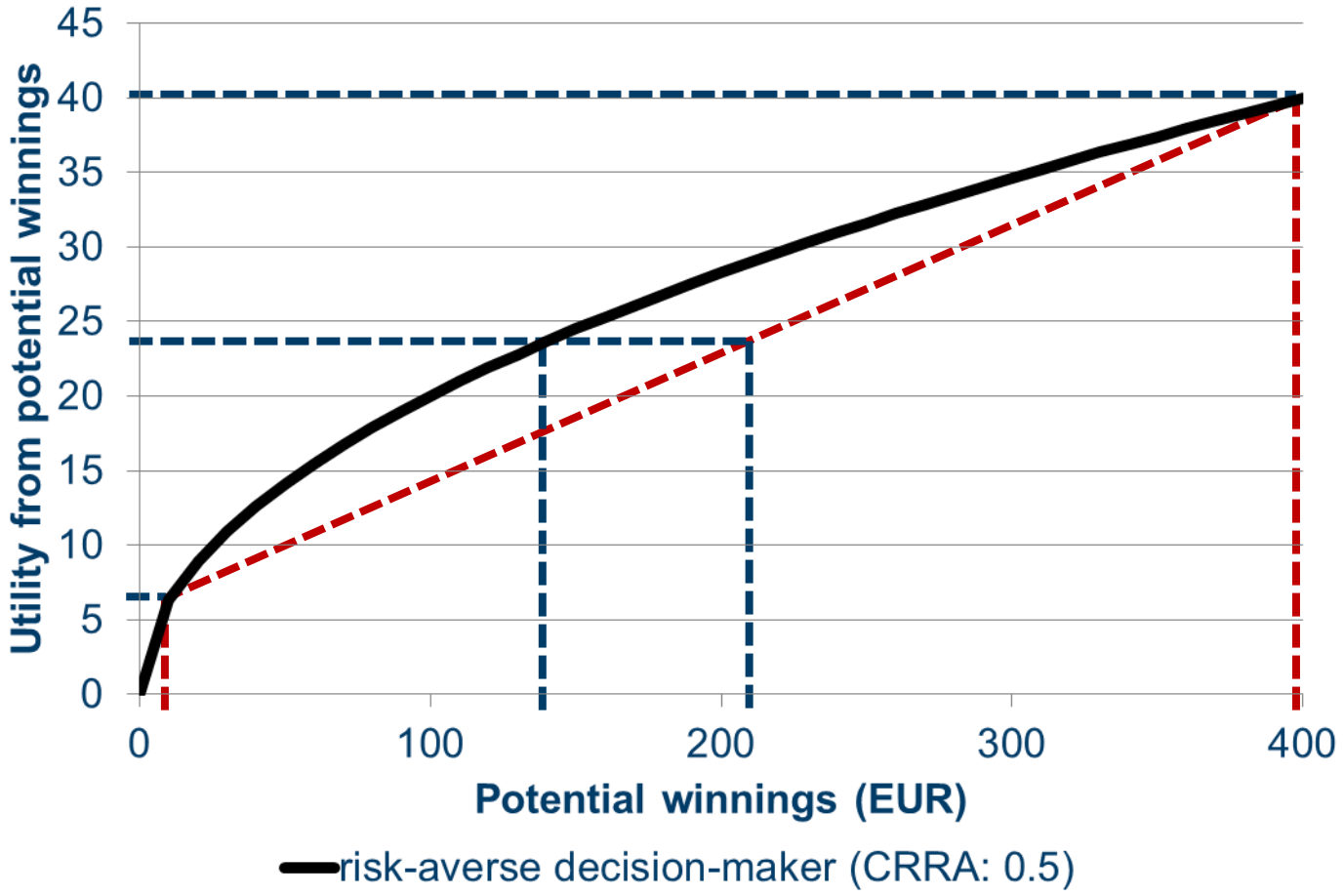
Back up

The power utility function as a methodological basis



Literature review exhibit lack of knowledge with regard to comparisons

Authors	Risk attitude			Comparison	
	Farmers	Foresters	Forestry student	HL and EG task	HL task and SA
Harrison and Rutström 2008			✓	✓	
Dave et al. 2010				✓	
Loomes and Pogrebna 2014			✓	✓	
Reynaud and Couture 2012	✓			✓	✓
Maart-Noelck and Musshoff 2014	✓		✓		✓
Lönnqvist et al. 2011					✓
Musshoff and Maart-Noelck 2014		✓			✓
Brunette et al. 2014		✓			
…and further studies	✓		✓		

✓ Study contributes to this field of research
✓ Study contributes to a comparable field of research

Descriptive statistics of participants

Variable	Mean value (standard deviation)		
	Foresters	Farmers	Forestry students
	N=116	N=150	N=100
Gender (male: 0; female: 1)	0.13	0.11	0.31
Age (years)	43.97 (13.15)	36.71 (12.80)	23.09 (2.51)
University degree (no: 0; yes: 1)	0.88	0.41	0.15
Self-employed (no: 0; yes: 1)	0.12	0.87	-
Experience with experiments (no: 0; yes: 1)	0.39	0.55	0.53

EG task, HL task und SA differ in all groups