



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

Risk attitudes of farmers, foresters and students: An experimental multimethod comparison

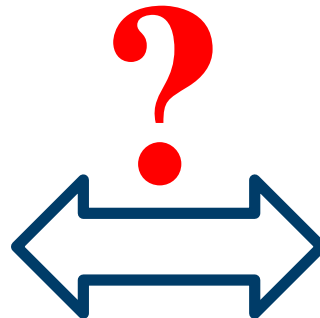
Philipp Sauter, Daniel Hermann and Oliver Musshoff

AARES 2016 Annual Conference

4th of February 2016

Philipp Sauter

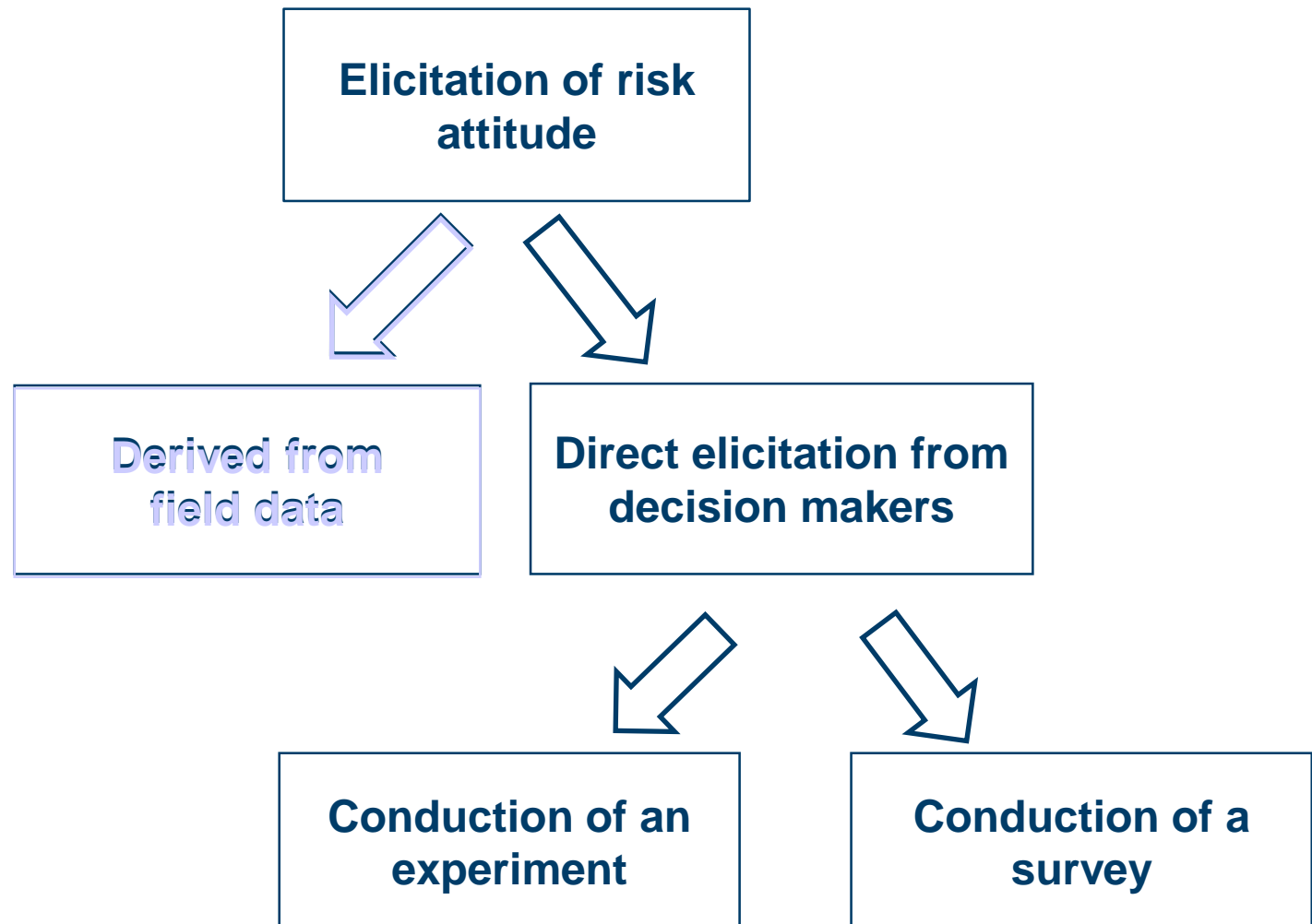
Importance of the risk attitude for agricultural decisions



Importance of the risk attitude for forestry decisions



Two principle ways for eliciting the risk attitude



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 €	$-2.48 \leq r \leq -1.71$
4	20%	80%	A ○ ○ B	20%	80%	74.70 €	$-1.27 \leq r \leq -0.95$
6	30%	70%	A ○ ○ B	30%	70%	44.55 €	$-0.7 \leq r \leq -0.49$
8	40%	60%	A ○ ○ B	40%	60%	14.40 €	$-0.31 \leq r \leq -0.14$
10	50%	50%	A ○ ○ B	50%	50%	-15.75 €	$-0.01 \leq r \leq 0.15$
12	60%	40%	A ○ ○ B	60%	40%	-45.90 €	$0.28 \leq r \leq 0.41$
14	70%	30%	A ○ ○ B	70%	30%	-76.05 €	$0.54 \leq r \leq 0.68$
16	80%	20%	A ○ ○ B	80%	20%	-106.20 €	$0.82 \leq r \leq 0.97$
18	90%	10%	A ○ ○ B	90%	10%	-136.35 €	$1.15 \leq r \leq 1.37$
20	100%	0%	A ○ ○ B	100%	0%	-166.50 €	$1.68 \leq r \leq 2.25$

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 €	<input type="checkbox"/>	-41.45 €	$r > 1.37$
2	136.00 €	216.75 €	<input type="checkbox"/>	-35.07 €	$0.97 < r \leq 1.37$
3	102.00 €	272.00 €	<input type="checkbox"/>	-24.45 €	$0.68 < r \leq 0.97$
4	68.00 €	332.50 €	<input type="checkbox"/>	-11.20 €	$0.41 < r \leq 0.68$
5	51.00 €	365.50 €	<input type="checkbox"/>	-3.20 €	$0.15 < r \leq 0.41$
6	34.00 €	388.90 €	<input type="checkbox"/>	0.00 €	$-0.15 < r \leq 0.15$
7	25.50 €	394.85 €	<input type="checkbox"/>	-1.27 €	$-0.49 < r \leq -0.15$
8	17.00 €	396.95 €	<input type="checkbox"/>	-4.47 €	$-0.95 < r \leq -0.49$
9	4.25 €	397.40 €	<input type="checkbox"/>	-10.62 €	$r \leq -0.95$

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 CRRRA 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.



GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

Thank you!

Philipp Sauter

Georg-August-University of Goettingen
Department for Agricultural Economics and Rural Development
Farm Management Group
Platz der Goettinger Sieben 5
37073 Goettingen
Germany

Phone: +49 (0) 551 39-9321

Email: philipp.sauter@agr.uni-goettingen.de

Literature

- Abdellaoui, M., Driouchi, A. and, L'Haridon, O. (2011). Risk aversion elicitation: reconciling tractability and bias minimization. *Theory and Decision* 71, 63–80.
- Brunette, M., Foncel, J. and, Kéré, E.N. (2014). Attitude towards risk and production decision: an empirical analysis on French private forest owners. *Etudes et Documents No. 10* (CERIUM - Centre d'études et de recherches internationales: Clermont Ferrand, France). Available at: <http://www.cerdi.org/uploads/ed/2014/2014.10.pdf> (17.10.2014).
- Dave, C., Eckel, C.C., Johnson, C.A. and, Rojas, C. (2010). Eliciting risk preferences: When is simple better? *Journal of Risk and Uncertainty* 41, 219–243.
- Harrison, G.W. and Rutström, E.E. (2008). Risk aversion in the laboratory. In: Cox, JC and Harrison, GW (Ed.) *Risk aversion in experiments*, pp. 41–196. Emerald Group Publishing Limited, Bingley, UK.
- Holt, C. A., and Laury, S. K., (2002). Risk aversion and incentive effects. *American Economic Review* 92 (5), 1644-1655.
- Eckel, C.C. and Grossman, P.J. (2008). Forecasting risk attitudes: An experimental study using actual and forecast gamble choices. *Journal of Economic Behavior & Organization* 68, 1–17.
- Laury, S.K., McInnes, M.M. and, Swarthout, J.T. (2012). Avoiding the curves: Direct elicitation of time preferences. *Journal of Risk and Uncertainty* 44, 181–217.
- Lönnqvist, J.-E., Verkasalo, M., Walkowitz, G. and, Wichardt, P.C. (2011). Measuring individual risk attitudes in the lab: task or ask? An empirical comparison. Working paper. SOEPpapers on Multidisciplinary Panel Data Research (DIW Berlin: Berlin, Germany). Available at: http://www.diw.de/sixcms/detail.php?id=diw_01.c.371649.de (09.01.2015).
- Loomes, G. and Pogrebna, G. (2014). Measuring Individual Risk Attitudes when Preferences are Imprecise. *The Economic Journal* 124, 569–593.
- Maart-Noelck, S.C. and Musshoff, O. (2014). Measuring the risk attitude of decision-makers: are there differences between groups of methods and persons? *Australian Journal of Agricultural and Resource Economics* 58, 336–352.
- Masclet, D., Colombier, N., Denant-Boemont, L. and, Lohéac, Y. (2009). Group and individual risk preferences: A lottery-choice experiment with self-employed and salaried workers. *Journal of Economic Behavior & Organization* 70, 470–484.
- Musshoff, O. and Maart-Noelck, S. C., (2014). An experimental analysis of the behavior of forestry decision-makers: the example of timing in sales decisions. *Forest Policy and Economics* 41, 31-39.
- Reynaud, A. and Couture, S. (2012). Stability of risk preference measures: results from a field experiment on French farmers. *Theory and Decision* 73, 203–221.

Sources for pictures

<https://de.wikipedia.org>

www.schleswig-fg.de

www.ihb.de

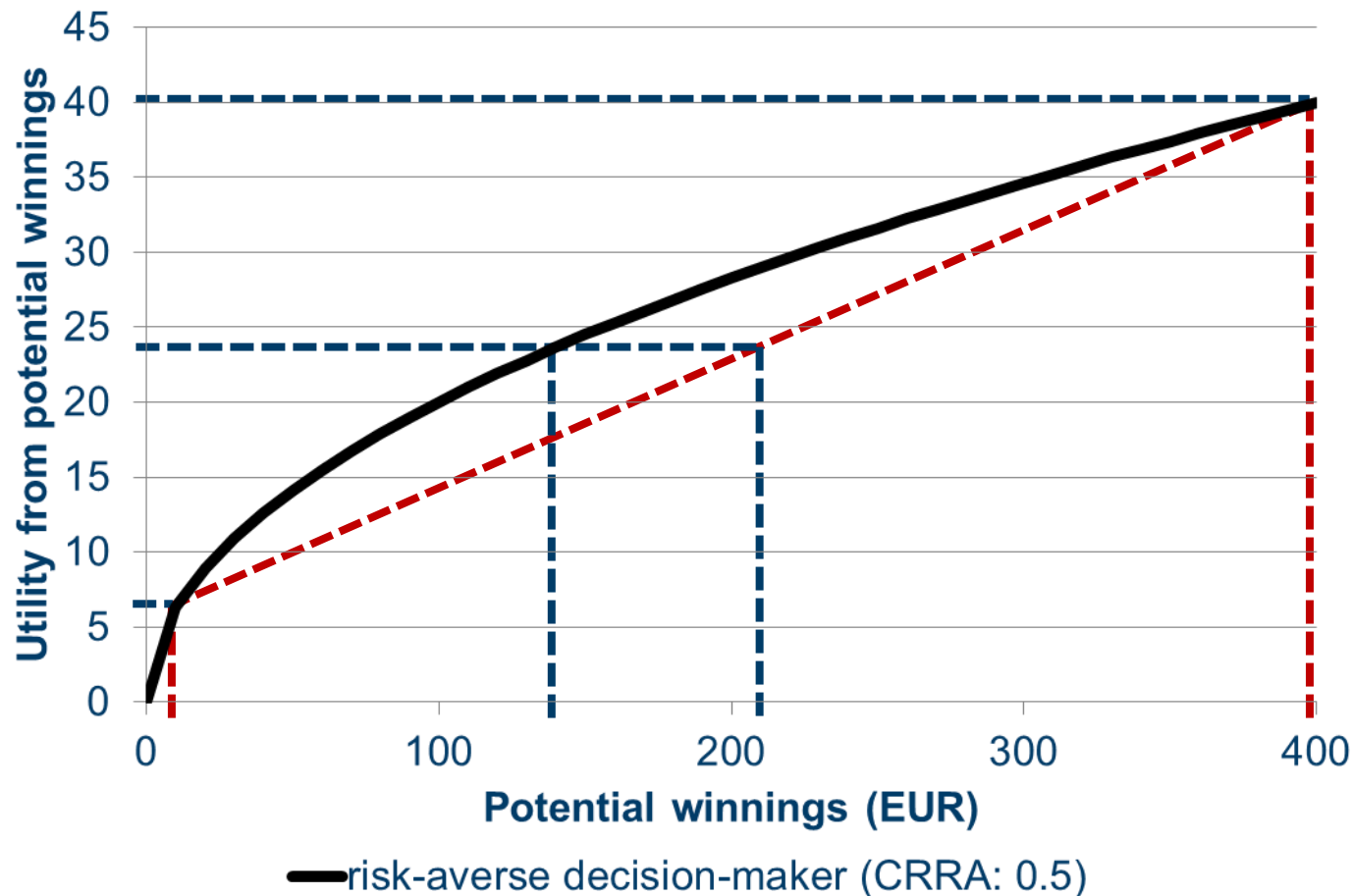
www.de.wikipedia.org



GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

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

