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Experimental Measurement of Stakeholder Expectation Formation and Risk Taking Behaviour for Integrated Regional Agricultural Land Use Modelling

Marius Eisele

Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg Institute), University of Hohenheim,
maris.eisele@uni-hohenheim.de

Christian Troost

Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg Institute), University of Hohenheim

Thomas Berger

Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg Institute), University of Hohenheim

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Experimental Measurement of Stakeholder Expectation Formation and Risk Taking Behaviour for Integrated Regional Agricultural Land Use Modelling

Marius Eisele^a, Christian Troost^a, Thomas Berger^a

(a) *Dep. of Land Use Economics, Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg Institute), University of Hohenheim (Marius.Eisele@uni-hohenheim.de)*

Abstract: Understanding how stakeholders respond to climate signals, form expectations about the future and adapt behaviour under uncertainty is crucial for simulating land use change in integrated assessment models. Traditional economic models of expectation formation assume rational or quasi-rational patterns of expectation formation and have typically been derived in the context of price expectations. Approaches for modelling decisions under uncertainty typically either follow the paradigms of (subjective) expected utility maximization or prospect theory.

These approaches however may not fit to the analysis of climate change responses due to ambiguous climate signals, a long time span of change, and the significance of experiential learning. We developed a computer-based experiment that simulates climate variability as well as uncertainty about upcoming climatic conditions in the context of agricultural land use decisions. The software visualizes climate variability and decision outcomes for participants, and records their decisions and stated expectations. In this way, sequential learning processes can be observed and patterns of expectation formation and risk behaviour - including biases and heuristics described e.g. by Tversky & Kahnemann - can be analyzed.

We applied the approach in several sessions to farmers and undergraduate students (n=97). Based on the results, we formulate behavioural models that are context- and individual-specific and reflect experiential learning. Prevalence of behavioural patterns informs the parameterization of a multi-agent model (MPMAS) that is part of an integrated regional-scale land use modelling system.

The method proved successful in eliciting behavioural parameters, easy to implement, and comprehensible to non-academics, as confirmed by participant evaluation after the experiment.

Keywords: Expectation formation; experimental economics; stakeholders; experiential learning; climate change impact assessment.