Optimization of Indemnity and Basis Risk Bounds in Index-based Insurance under Drought Risk

O. Evkaya, Atılım University, TR

S. K. Yildirak, Hacettepe University, TR
kasirga@hacettepe.edu.tr

A. S. Kestel, Middle East Technical University, TR

G. W. Weber, Middle East Technical University, TR

Abstract
After the recent drastic changes in the world's climate conditions, the weather based risk management methods became into prominence for many countries. Especially, as a result of climate change, the frequency and severity of extreme weather events has been increased. It brings about an increasing need for the more powerful early warning systems and ex-post risk transfer mechanisms. Index-based insurance is thought to be efficient alternative risk management against the impacts of natural hazards for the drought. The most feasible policy is the one that directly based on the positive relation between any suitable index measure and the yield loss. At this step, the insurer must be aware of the basis risk phenomena coming from the mismatch between the real and the expected loss of the policyholder. For this reason, the modelling part of this type of insurance is the primary step to manage the loss resulted in any dry season. We propose alternative models to describe the wheat yield loss for the selected farms in Turkey using MCMC method. Based on these models, actuarial valuation is made for each plantation area. Nonlinear optimization is considered for the basis risk estimation of index-based insurance contracts.

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