

Rating crop insurance contracts with skewed distributions: a Bayesian approach

Vitor A. Ozaki¹, Ralph S. Silva²

¹ Department of Exact Sciences, University of São Paulo at Piracicaba, Brazil

² Institute of Mathematical and Statistics, State University of Campinas, Brazil

Unlike other countries, such as, U.S. and Spain, which develop their insurance programs long ago, Brazil started the Federal Crop Insurance Program in 2004. Given the increasing interest in crop insurance, accurate calculation of the premium rate is of great importance. This study addresses the crop-yield distribution issue and its implications to pricing a crop insurance contract. When analyzing the data generating process of yields we consider the dynamic structure of the data incorporating the spatial correlation in the Bayesian Hierarchical model resulting in spatio-temporal models. We choose a more flexible probability density function known as the Skew-Normal distribution estimating all the parameters through the Markov Chain Monte Carlo (MCMC) algorithm. Comparing the premium rates derived in our model (BR) with the empirical rates (ER) method, commonly used by the insurance companies, one can notice that the ER is higher than BR for low risk areas and lower in high risk areas. It means that the insurance companies are underpricing the insurance contract for high risk areas and overpricing the low risk areas.