Basis Risk Comparison of Bayesian based Wheat Yield Estimation against drought

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\section{Introduction.}

This study aims testing the basis risk performance of constructed different index based insurances against drought. Rainfed wheat production in the 11 TIGEM stations is taken as the subject of our study, these farms are located mostly at Central Anatolia. We first use the crop and location specific model developed by FAO to simulate the water related variables such as evapotranspiration, water deficiency, water satisfaction index, and estimate the crop yield function for rain-fed wheat production in selected stations. A spatio-temporal yield model is estimated by Bayesian method through the use of Markov Chain Monte Carlo algorithms. Standardizing the simulated variables over Normalised Difference Vegetation Index (NDVI), impact of drought related variables on wheat yield is studied. We used the Fixed Effect Spatio-Temporal model to predict the wheat yield for the 11 stations. Based on these estimations, we constructed a one year insurance policy for year 2006. In order to compare the basis risk performance of given models, we calculated the premium and indemnity payments for the selected farms.

\section{Model Selection}

Bayesian Spatio Temporal models are considered to obtain prediction functions for the wheat yield. We employed these techniques to analyze the relationship between the wheat yield and the predictor variables. According to Yıldırak et al. (forthcoming), Fixed Effect Spatio-Temporal (FEST) model is preferable to predict the wheat yield for year 2006 at 11 stations. The ratios of AMS outputs by NDVI values provides statistically significant predictor variables for FEST models.
3 Insurance Design

A threshold based insurance contract for year 2006 is constructed according to the predicting model. We used the estimation models to set the strike level for the selected explanatory variables. Moreover, premium and indemnity calculations are made based on this trigger level for 11 stations. We tested the basis risk performance for constructed insurance policies.

4 Results

Drought is one of the biggest threat that affects agriculture. In this study, we try to observe the basis risk of threshold based insurance policies generated by Bayesian Estimation functions for the wheat yield.

References


