Geophysical Research Abstracts
Vol. 20, EGU2018-795, 2018
EGU General Assembly 2018

Weather, Climate and Production Risk

Hongliang Zhang
University of Neuchâtel, Institute of Economic Research, Switzerland (hongliang.zhang@unine.ch)

A variety of conclusions have recently been drawn about climate change's impacts on U.S. crop yields, net returns, and farmland values in the climate econometrics literature. Yet little attention has been paid to climate change's impacts on weather-related production risk. We investigate climate change impacts on farm productivity and production risk on U.S. Pacific Northwest winter wheat farms. Using farm-level data from the Census of Agriculture, we use a partial-moment-based approach to estimate climate and irrigation effects on winter wheat yield and farm net return distributions. Results show that mean precipitation, growing degree-days, and freezing degree-days have highly distinct seasonal effects on the first three moments (mean, variance and skewness) of the farm-level yield and net return distributions.

Estimates from econometric models are used to evaluate climate and irrigation effects on production risk based on the expected utility and risk-value decision-making models and to simulate changes in yield and net return distributions due to irrigation and projected climate changes. Irrigation substantially increases irrigated farms' welfare by shifting the winter wheat yield distribution outwards, and by increasing mean net returns but also decreasing the skewness of the net return distribution and thus reducing downside risk. By the mid-21st century, climate-change projections from 20 global climate models downscaled to the study region reveal a range of possible positive and negative effects on the winter wheat yield and net return distributions.