

Innovation, Climate, and Ontario Corn and Soybean Yield Volatilities

Presenter: Yuetian Jiang, MSc Candidate

Advisor: Alan P. Ker, Professor

Department of Food, Agricultural and Resource Economics, University of Guelph

Director, Institute for the Advanced Study of Food and Agricultural Policy

The importance of yield volatility, specifically low yield realizations, is evidenced by the significant public monies | via business risk management programs | meant to offset the financial burdens of such outcomes. Significant increases in yield volatilities has been well documented in the literature. Corn and soybean yields and yield volatilities in Ontario are modelled in a number of ways. First, yields are modelled as a mixture of two normals (to accommodate the variety of yield density structures) allowing for differing rates of technological change in each component. There is strong evidence for both corn and soybean that rates of technological change differ in different parts of the yield distribution giving rise to increased volatility. There is additional evidence, albeit comparatively weaker, that variances within the components are also heteroskedastic. The stability of the component probability, that is the probability of a low tail realization, is tested for and there is some evidence that the probability is increasing overtime. In addition, the probability of a low tail outcome is modelled as a function of climate variables including Vapor Pressure Deficit (VPR), Harmful Degree Days (HDD), Growing Degree Days (GDD), and precipitation. The results are consistent with the literature investigating midwest corn yields. We also find some evidence that yields, because of technological innovations, are becoming more susceptible to precipitation shortfalls. The spatial variation in yield trends and volatilities is modelled in a Lobell and Ansner (2003, Science) framework to consider the effects of a changing climate on yield trends and volatility trends.