Measuring Agricultural Market Risk
GARCH estimation vs. Conditional Extreme Value Theory

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ABSTRACT

Despite the enormous number of studies for Value at Risk application in financial markets and various commodity markets, similar researches in the agricultural market are relatively new and limited. Besides, of many sorts of estimation techniques, there seems to be no paper about the combination of univariate GARCH models and Extreme Value Theory (EVT). This study examines the effectiveness of twelve GARCH-based models on two risk measures: Value at Risk and Expected Shortfall for two agricultural commodities: wheat and soybean in the U.S market. Six of them are EVT-free models while the remainings are EVT-based models or conditional EVT models. For each category, models are six combinations of three types of GARCH models (GARCH, GJR-GARCH, and EGARCH) to two types of distributions (Gaussian and Student's). To assess the validity of models, I conduct the back-testing and several out-of-sample test. This study shows the poor performance of EGARCH models in comparison with GARCH and GJR-GARCH models. Next, the Student's t-distribution can cause Value at Risk overestimation. Finally, the mixture of GARCH models and EVT performs better than the corresponding GARCH-type one. Several assumptions during model implementation, however, hide the perils that can harm the reliability of back-testing results.

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