Trade Can Buffer Climate-Induced Risks and Volatilities in Crop Supply

Objective

While many studies have examined the climate impact on average corn yields, little attention has been given to the climate impact on production volatility. This study investigates the future volatility and risks associated with global corn supply under climate change, evaluating the potential benefits of two key adaptation strategies: irrigation and market integration.

Approach

A statistical model is employed to estimate corn yield response to heat stress while using NEX-GDDP-CMIP6 climate data to project future production volatility and risks of substantial yield losses. Three metrics are introduced to quantify these risks: Sigma (σ), the standard deviation of year-on-year yield change, which reflects overall yield volatility; Rho (ρ), the risk of substantial loss, defined as the probability of yield falling below a critical threshold; and Beta (β), a relative risk coefficient.

Impact

While irrigated corn production exhibits a smaller rise in volatility, suggesting irrigation as a potential buffer against climate change impacts, it is not a sustainable option as it can cause groundwater depletion. Conversely, global market integration significantly reduces overall volatility and market risks, while also addressing sustainability concerns.

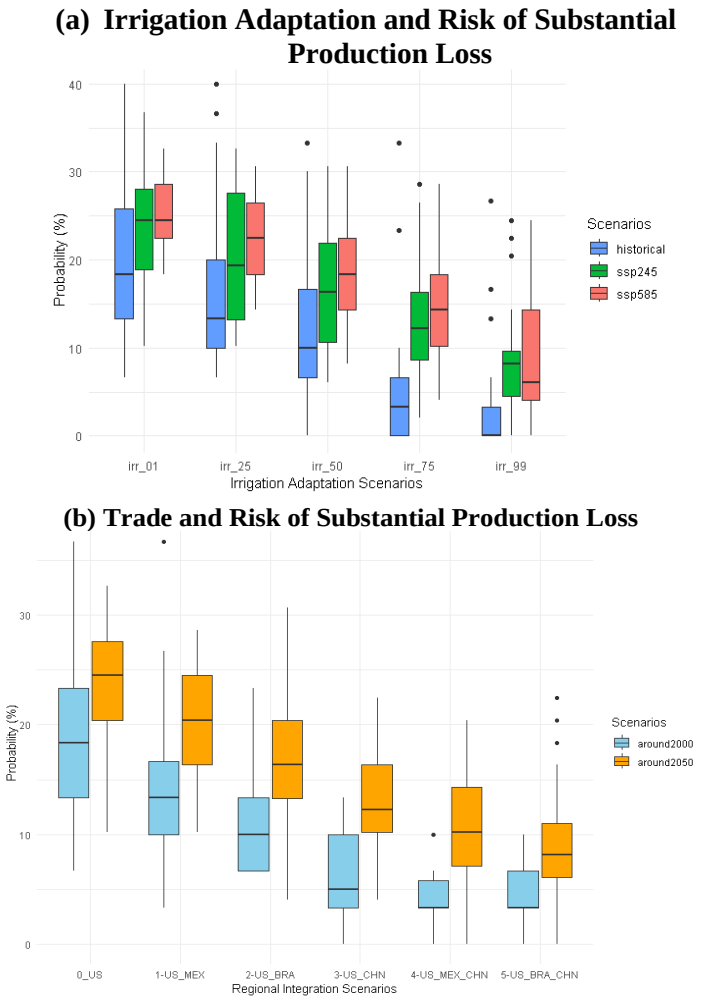

Figure: Irrigation (a) and trade (b) can reduce the risk of substantial supply loss (NEX-GDDP-CMIP6)

Haqiqi, I., 2024: Trade can buffer climate-induced risks and volatilities in crop supply. Environmental Research Food Systems, https://doi.org/10.1088/2976-601x/ad7d12.