

# Spatial Correlation among Maize Markets in Tanzania and the Benefit of Pooling the Risk to Design an Insurance Scheme

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## Abstract

Being at the same time a major staple food and a crop very sensitive to weather and price fluctuations, maize is in the core of food security challenges in Tanzania. In a country where agricultural production is mainly driven by smallholder farmers and where the exposure to weather shocks such as drought is likely to increase because of climate change, implementing an efficient and affordable insurance scheme is of the essence. A particular feature in designing the premium is that the risk faced by farmers might be highly correlated, which can result in large losses and overpriced premiums. Our study aims at quantifying the correlation among twenty markets in Tanzania and assessing the benefit of pooling the risk across the regions to implement a national insurance scheme compared to the situation with several small insurances. To this end, we model the correlation using two types of local time-series separately: the monthly price returns of maize and meteorological data. We use a Copula-GARCH model on the monthly returns to determine time-varying pairwise correlations and compare the Value-at-Risk at several levels for the aggregate risk to that of the risk taken separately. Our results show that despite the correlation among the markets for each type of data, premiums would be substantially lowered by pooling the risk, hence aggregating the markets into a national insurance scheme would reap considerable benefits.