



Reducing Production Basis Risk through Rainfall Intensity Frequency (RIF) Indexes: Global Sensitivity Analysis' Implication on Policy Design

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The weather index insurance promises financial resilience to farmers struck by harsh weather conditions with swift compensation at affordable premium thanks to its minimal adverse selection and moral hazard. Despite these advantages, the very nature of indexing causes the presence of "production basis risk" that the selected weather indexes and their thresholds do not correspond to actual damages. To reduce basis risk without additional data collection cost, we propose the use of rain intensity and frequency as indexes as it could offer better protection at the lower premium by avoiding basis risk-strike trade-off inherent in the total rainfall index. We present empirical evidences and modeling results that even under the similar cumulative rainfall and temperature environment, yield can significantly differ especially for drought sensitive crops. We further show that deriving the trigger level and payoff function from regression between historical yield and total rainfall data may pose significant basis risk owing to their non-unique relationship in the insured range of rainfall. Lastly, we discuss the design of index insurance in terms of contract specifications based on the results from global sensitivity analysis.