



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security

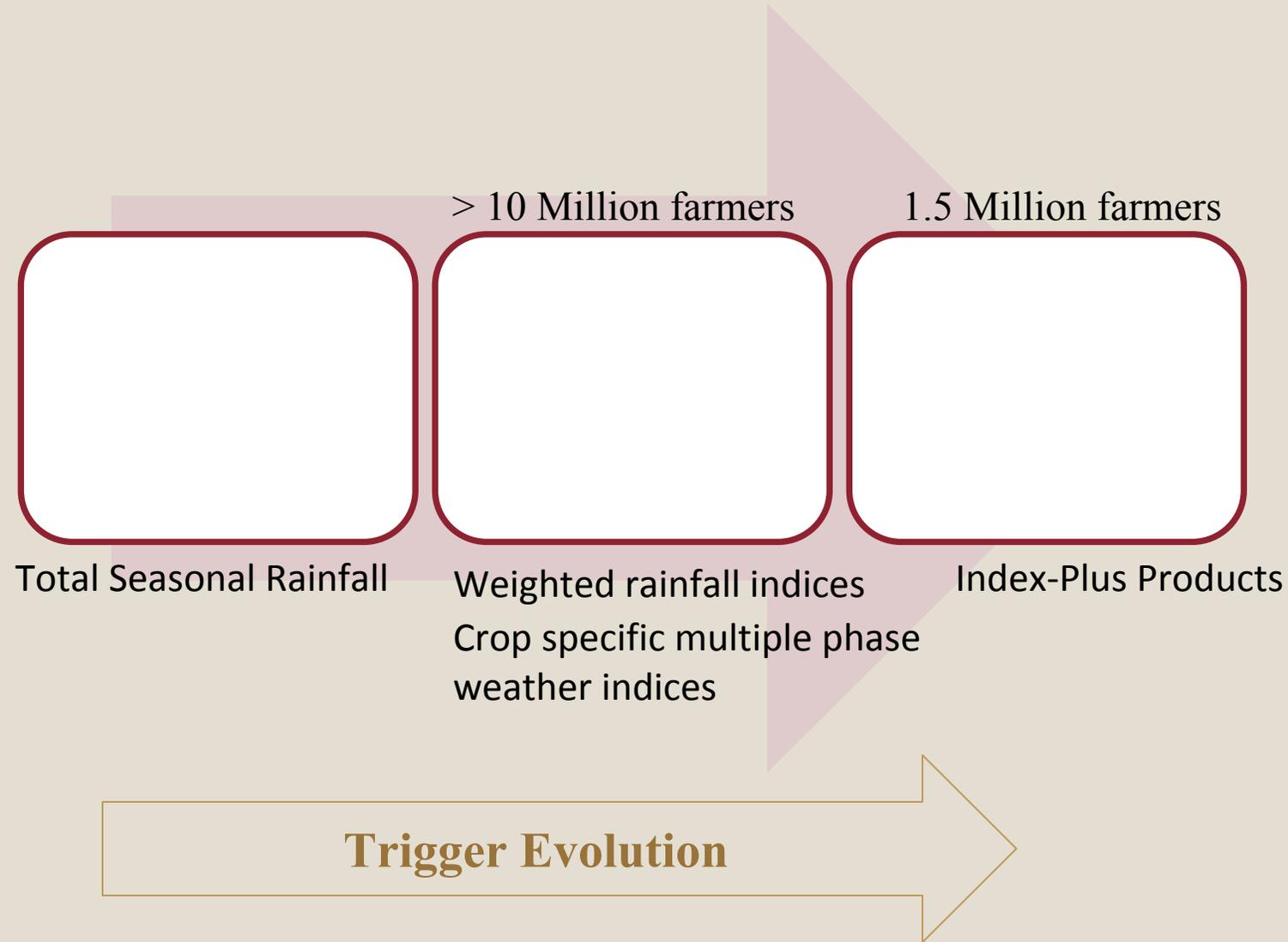


Case Study on CAM: Weather Based Index Insurance

Paresh B Shirsath, Shalika Vyas and Pramod Aggarwal

Weather Index Insurance (in India)

- Government providing support since 2007
- Indemnifies farmers against deemed crop losses due to adverse weather incidence
- Crops covered include perennial & horticulture crops like mango, apple, cashew, grapes & orange
- Sum Insured based on 'cost of cultivation'
- Risk based Premium rates
- Upfront Premium Subsidy from Government
- Pay-outs based on pre-defined triggers on specified weather parameters



WBCIS Trigger Design Process

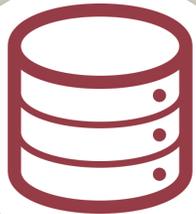
- **The triggers to be identified in such a way that major losses are captured.** Too conservative triggers tend to lead to frequent but smaller payouts, diluting the indemnity principle of insurance.
- For the purpose of selection of crops under WBCIS, consider factors such as availability of historical weather data, minimum cropped area, **weather perils capable of causing significant & quantifiable losses by change in measurable weather parameters.**
- State Governments will also continue to conduct the requisite number of Crop Cutting Experiments (CCEs) in areas where WBCIS is implemented to enable the implementing agencies **to make analytical study for assessing performance of the Scheme** vis-à-vis yield Index based crop Insurance Schemes (i.e. PMFBY) and **benchmarking of products.**

Challenges in Trigger Design Process

Benchmark Products

Product Design

01



Data

Availability of weather/yield data for required IU level

Absence of analytical study for assessing performance of the WBCIS triggers



02

03



Yield Proxies

Yield proxies are not documented

Insurance contract must be simple and explainable to farmers



04

05



Research

Lack of research on trigger design process

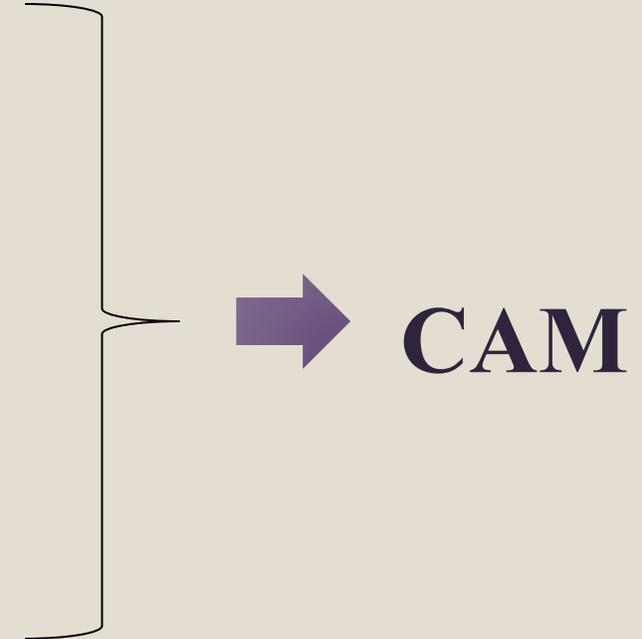
Weather Perils to be Covered

1. **Rainfall:** Deficit Rainfall, Excess rainfall, Unseasonal Rainfall, Rainy days, Dry-spell, Dry days
2. **Temperature:** High temperature (heat), Low temperature
3. **Relative Humidity**
4. **Wind Speed**
5. A combination of the above
6. Hailstorm, cloud-burst may also be covered as Add-on/Index-Plus products



Weather based index insurance contract- Key decision Points

- Which Weather indices to select?
- Relationship of weather indices with yield loss
- How to design contract
- Monitoring and claims settlement
- Evaluation of basis risk



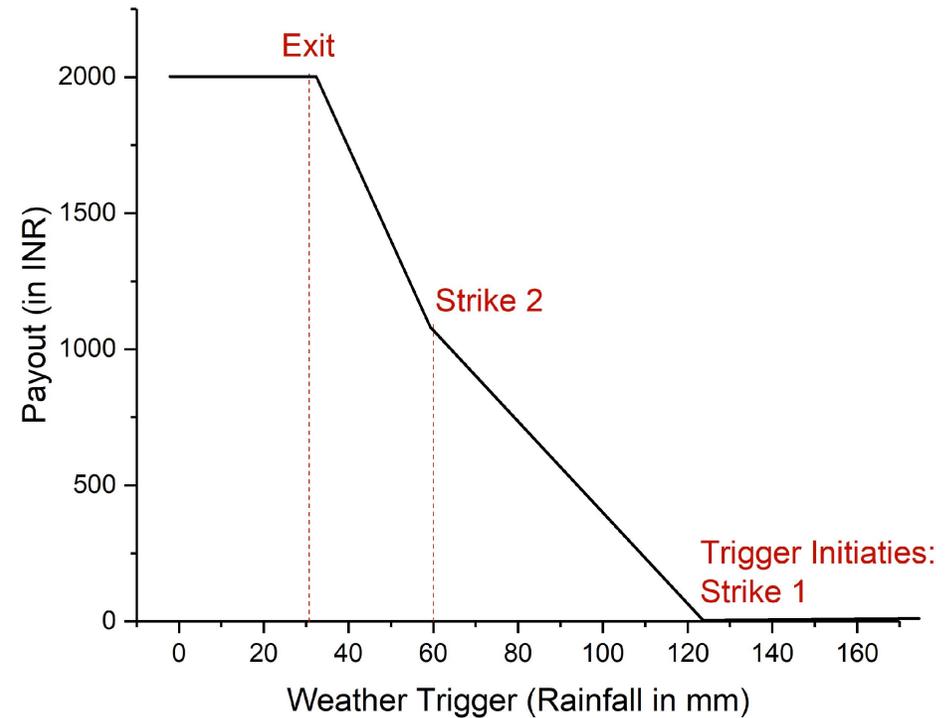
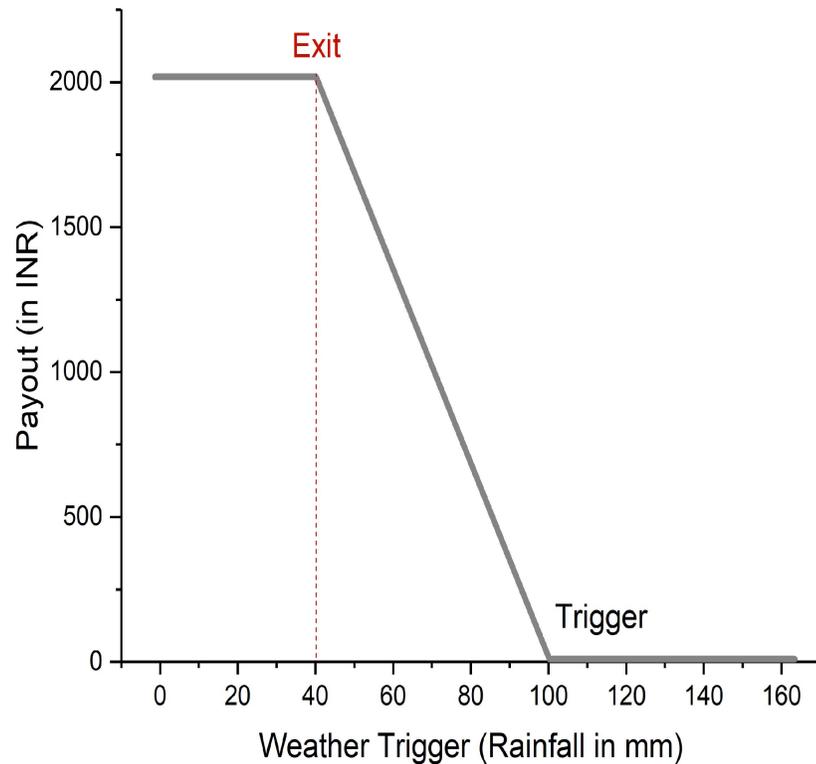
Designing a weather based index insurance contract

- **Step 1: Quantify crop yield- weather relationship**
 - *Statistical techniques like threshold regression, cluster analysis, copulas etc.*
 - *Crop Simulation modelling*

- **Step 2: Quantify weather triggers based on regression and following parameters**
 - crop water requirement and agro-climatic condition of the region
 - Location specific hydrology and water zone requirements
 - Local knowledge and expert judgement from local agronomists
 - Can use tools such as CROPWAT 8.0 (FAO)

Developing a Weather based Index Insurance Contract

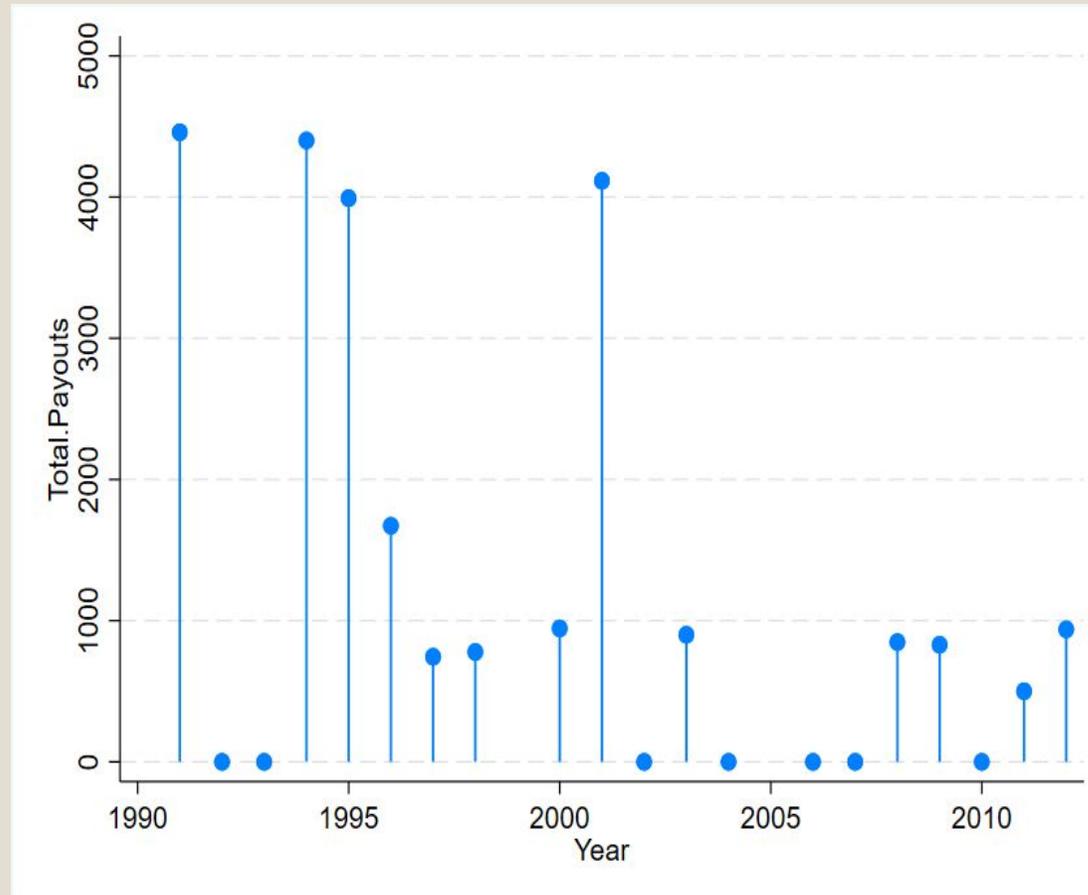
- How does a weather trigger work?



Weather Based Index Insurance- Results

■ Application 1: Claims Accrued

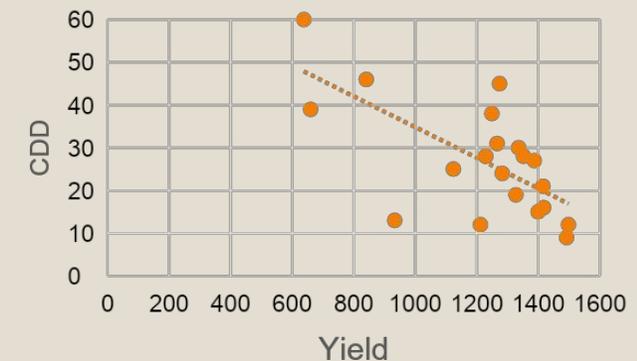
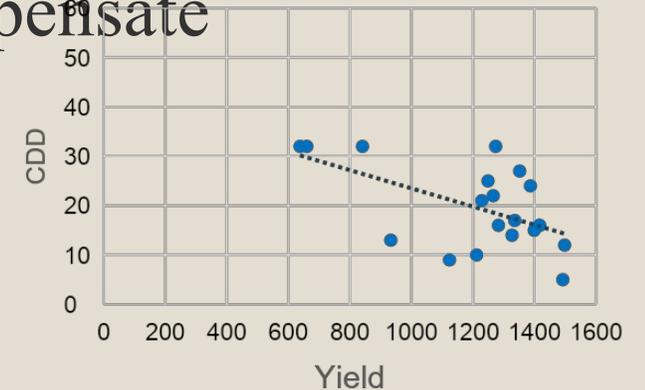
- *Claims from designed contract based on observed weather conditions- Monthly, Seasonal etc.*



Improved triggers for weather insurance: win-win products for farmers, industry and government

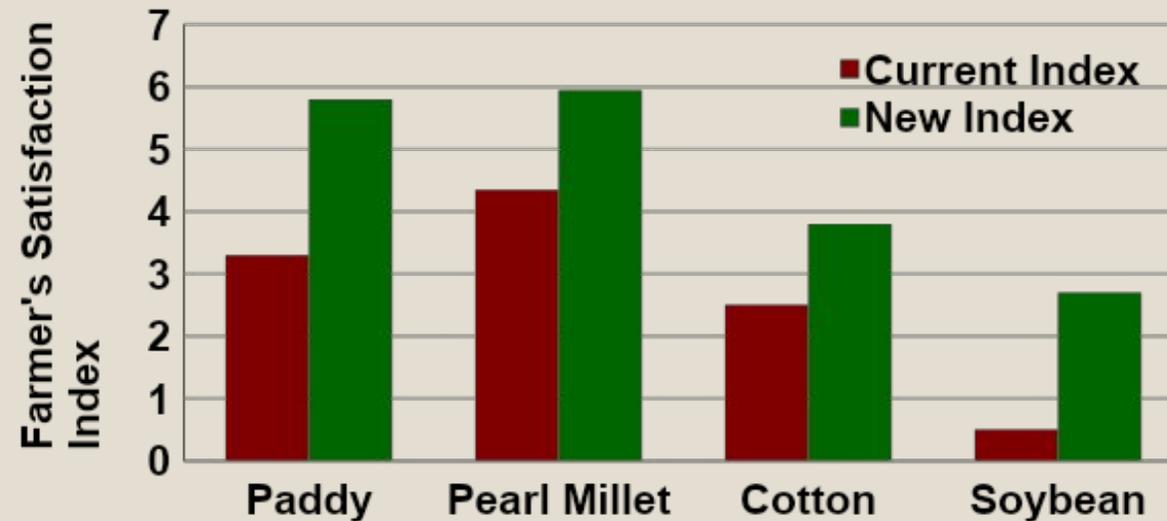
- Crop yield response through crop simulation models
- Pay-outs are structured against triggers to compensate farmers for their losses.

CSMs for trigger improvement:
An example of CDD



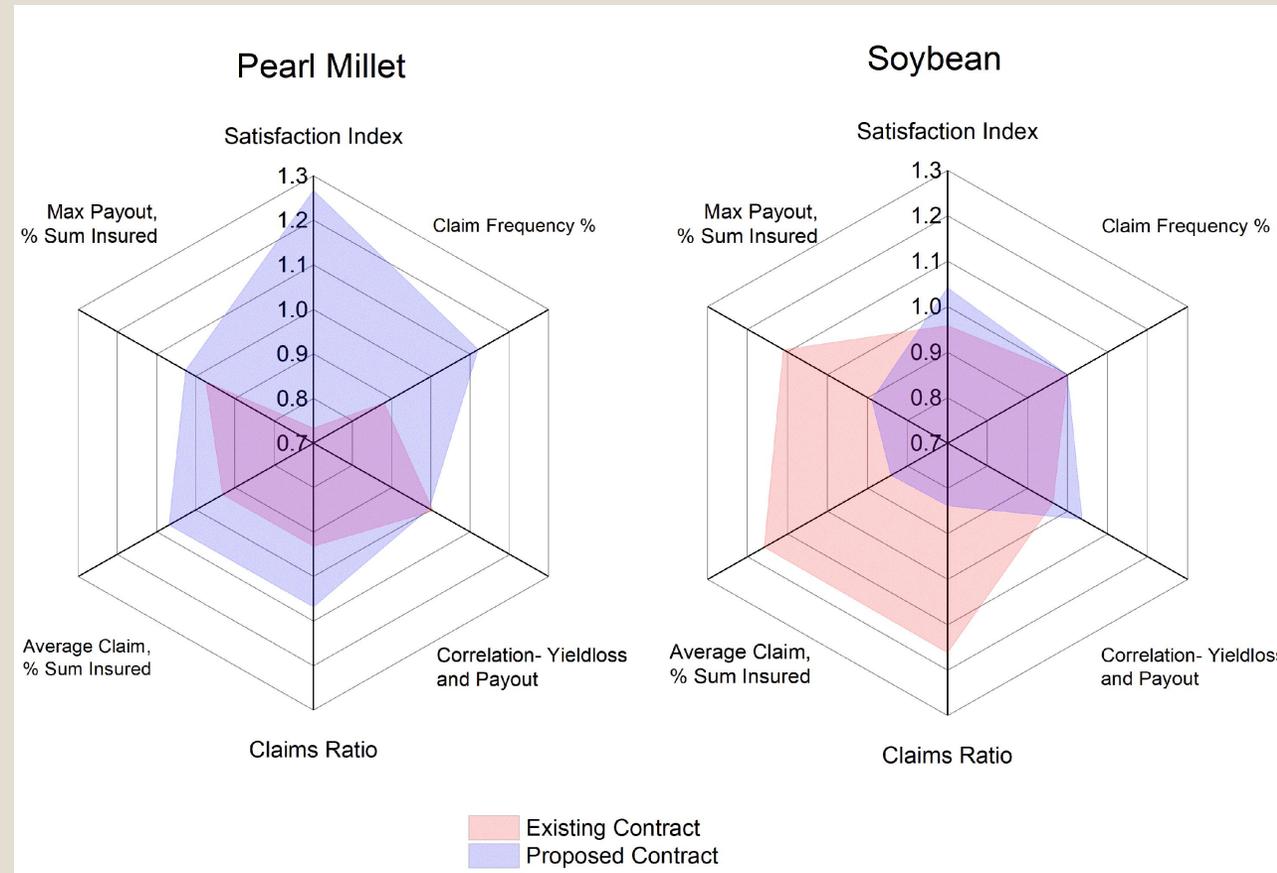
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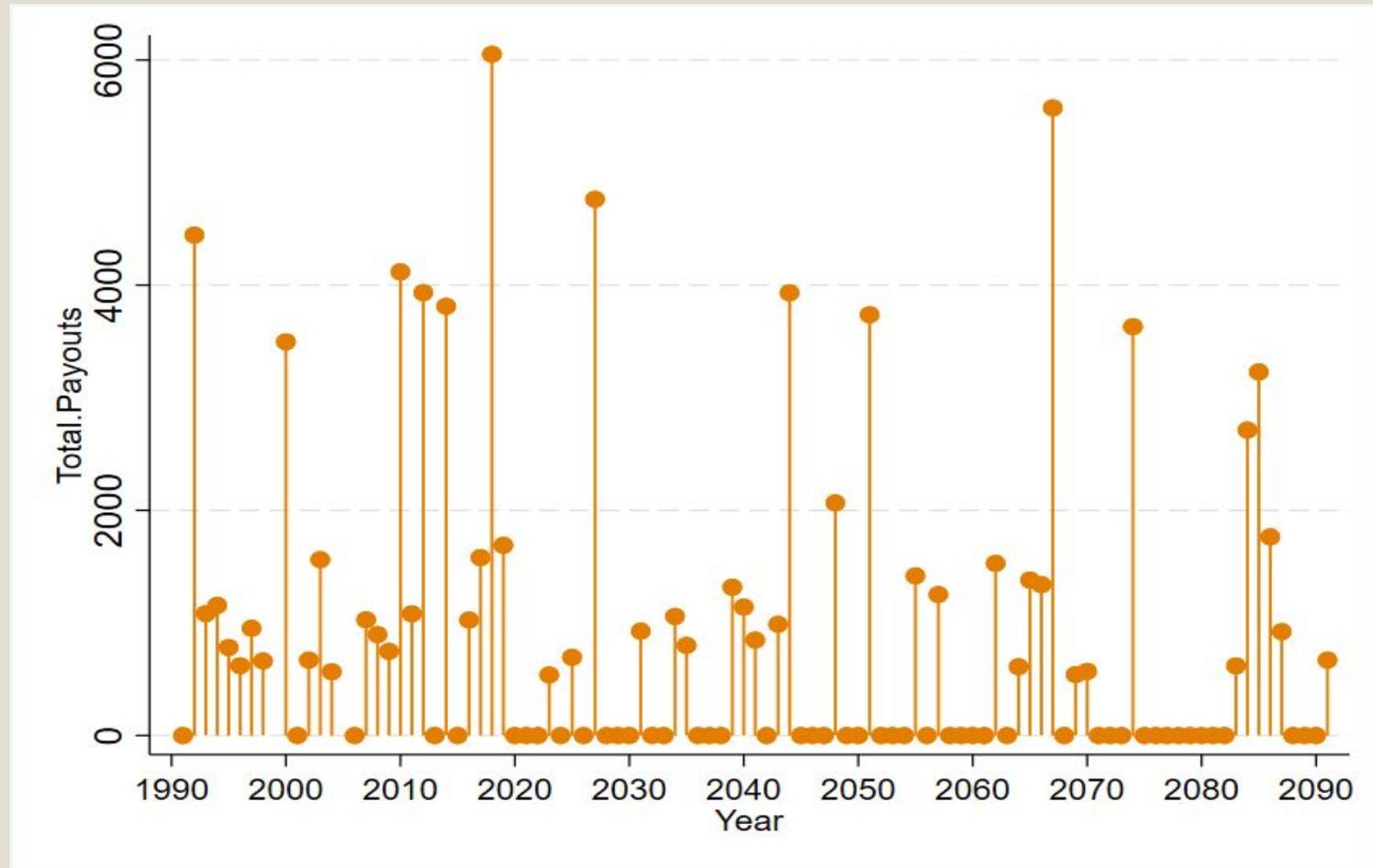
Weather Based Index Insurance- Results

- Application 2: Can compare results from reported/simulated yield to test effectiveness of contract design



Weather Based Index Insurance- Results

- Application 3: Can see implications of index insurance farmer income in future climate scenarios using weather data



Basis risk: still a challenge!!!

One key requirement of any index-based approach to agricultural insurance product design is that the claim payments from the indexed product are sufficiently correlated with yield losses of individual farmers, particularly in those years with significantly poor yields.

Spatial Basis Risk

Solution: Increase the number of weather station; or use satellite derived rainfall products.

Temporal Basis Risk

Solution: Contract redesigned considering onset/sowing time etc.



THANK YOU

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Terminologies

Term	Description
Basis Risk	Basis risk in index insurance arises when the index measurements do not match an individual insured's actual losses.
Claim Frequency	Number of claims made over the time period in consideration. Expressed as %.
Exit	It is the trigger level at which maximum pay-out happens for the given contract.
Index	It represents the nature and type of weather peril.
Pay-outs	The amount of claims paid to insurers.
Strike	This represents starting trigger threshold below/above which pay-outs comes in force as defined in the contract
Sum Insured	The sum insured is the maximum amount claim possible under the given contract.