

# GOBESHONA 4

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Building local climate knowledge

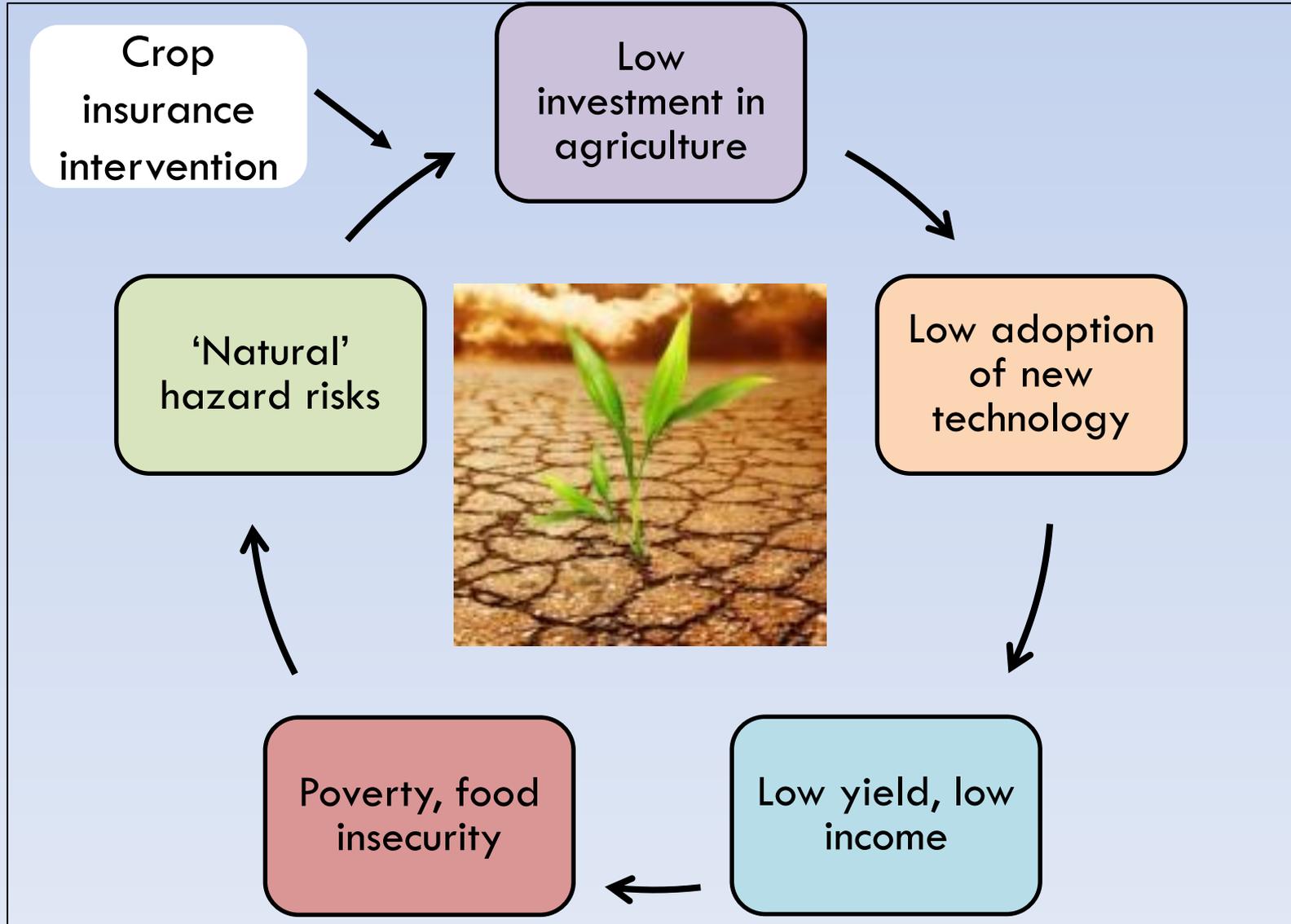
## **Climate change skepticism and index versus standard crop insurance demand in coastal Bangladesh**



Sonia Akter  
(National U. Singapore),  
Tim Krupnik (CIMMYT),  
Fahmida Khanam  
(CIMMYT)

**Dhaka, Bangladesh January 9, 2018**

# Agricultural insurance and poverty alleviation



# Traditional and indexed crop insurance

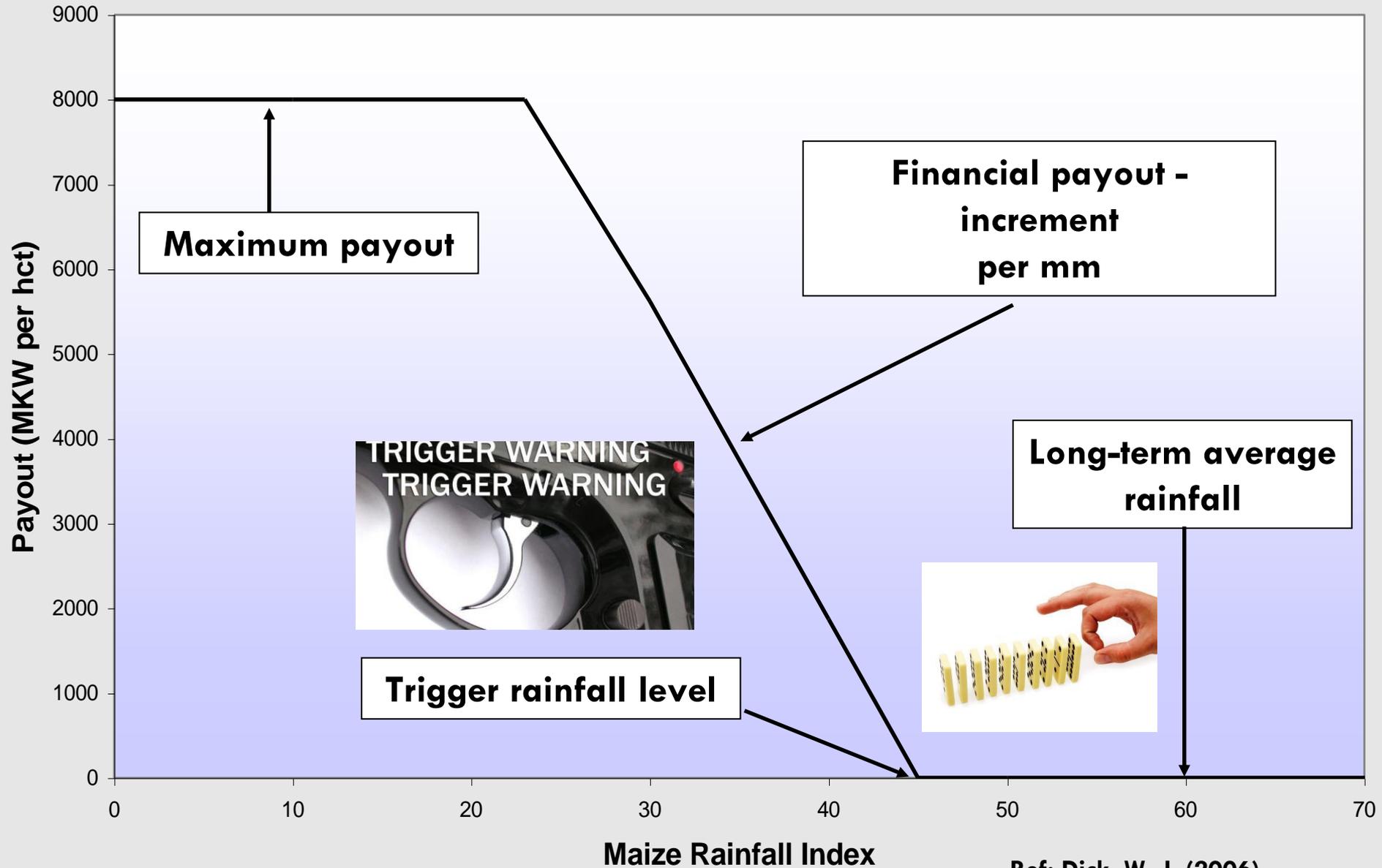
## □ **'Traditional' insurance**

- Payments based on physical verification
- Moral hazard
- High monitoring and administrative costs
- Operationally difficult for smallholder farmer agriculture

## □ **Weather index insurance (WII)**

- An index is a variable that is highly correlated with losses.
- Example indices: rainfall, temperature, regional yield, river height levels, etc.
- Payout is tied to the value of an "index"- not on actual losses.

# How does weather based index insurance work?



Ref: Dick, W. J. (2006)

## Advantages and challenges

### Advantages:

- Objective and transparent (at least to some)
- Provides timely payout where agencies are well functioning
- Reduces administrative costs for insurers
- Widely promoted as suitable for small-scale farmers

### Challenges:

- Basis risk – the potential mismatch between losses and payouts
- May not be suitable for all hazard types
- Data to identify trigger levels may not be easily available
- Index measurement may entail high upfront costs
- Primarily focusses on single-risk hazard protection
- Requires local adaptation – slows scaling up

- Low demand for index insurance products (Cole et al., 2010; Giné et al., 2008; Cole et al., 2011)
- Projects frequently require public sector subsidies
- People view insurance as a form of investment, and people save primarily to protect against shocks.
- Fatalistic beliefs and climate change skepticism?

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## Is There Too Much Hype about Index-based Agricultural Insurance?

HANS P. BINSWANGER-MKHIZE  
College of Economics and Management, China Agricultural University, Beijing, China

**ABSTRACT** Individual crop insurance has been largely abandoned in developing countries and replaced by insurance pilots based on weather indices. These pilot schemes have encountered low demand. Research suggests that better-off farmers may already be insured via income diversification, their assets and social networks, and may achieve profit-maximizing portfolios without formal insurance contracts. They would be interested in such contracts only if they reliably reduced their exposure to risk at lower costs than their self-insurance mechanisms. Conversely, poor farmers are not able to self-insure adequately, have to trade-off returns for reduced risks and could therefore benefit from a well-designed insurance. But they are constrained and, therefore, cannot advance the money before sowing time to buy insurance that pays out only after the harvest. Index insurance, therefore, cannot be scaled up. Even if a few farmers purchase it, governments will still need to run relief programmes for the uninsured. Standard ways suggested to improve the index insurance, such as reducing basis risks, educating farmers and improving weather data, do not improve the ability of small farmers to purchase insurance and may not improve product design sufficiently to be competitive with self-insurance of the better-off farmers.

### 1. Introduction

Risk and climate-risk aversion have long been viewed as limiting farmer adoption of technology, investment and welfare (Lipton, 1979, 1989). In the absence of government subsidies, all-pilot crop insurance to overcome this problem has rarely succeeded (Hazell et al., 1986). In the past decade, index-based agricultural insurance has been promoted as a potentially powerful tool to enhance welfare, technology adoption, input use and investment of small farmers (World Bank, 2005; Alderman and Haque, 2007; Hazell and Hess, 2010; Hazell et al., 2010). In 2007, a United Nations policy brief proclaimed boldly 'Pilot programs conducted in several developing countries have proven the feasibility and affordability of such products' (UN, 2007: 1). This article uses research on farmer behaviour under risk to assess whether demand for these products is likely to be as strong as hoped for by the promoters. Results from the pilot index-based insurance programmes are reviewed that show only limited demand, and are in line with the findings from behavioural studies.

In 1975 the economics team at the newly created International Crops Research Institute for the Semi-Arid Tropics in India developed an ambitious research programme on risk in agriculture. The key questions were whether agricultural risk was an impediment to adoption, input use and investment; how large farm-level income risks were; how farmers and workers mitigated such risks via their own behaviour; and whether – beyond the mitigation measures taken by farmers themselves – public policy and programmes could reduce such negative impacts on agriculture and for farm incomes. To investigate these issues we developed the ICRISAT

Correspondence Address: Hans Peter Binswanger-Mkhize, College of Economics and Management, China Agricultural University, Beijing, China. Email: binswangerh@gmail.com

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CCAFS Report No. 14

## Scaling up index insurance for smallholder farmers: Recent evidence and insights



Helen Greatrex, James Hansen, Sarentha Ganin, Fahel Dio, Sari Balesley, Margot Le Guen, Kofi Hiao, and Daniel Osgood



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## Bangladesh Crop Insurance: Helping Farmers Weather the Storm

## Skepticism and climate change?

- The act of rejecting, disputing, or questioning scientific evidence that the global climate is changing
  - that human actions are responsible for these changes
  - that without mitigation and adaptation, serious consequences for humankind may result (Akter et al. 2012; van Rensburg 2015).

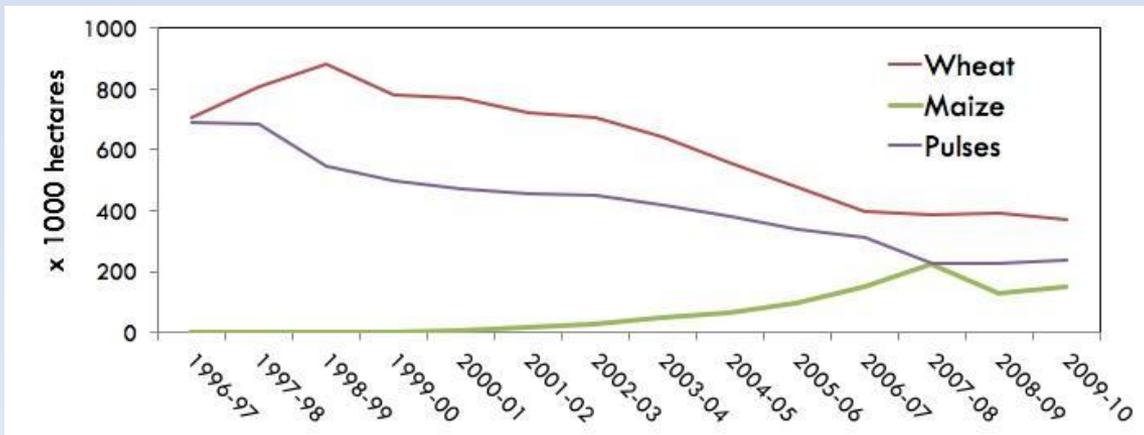
## Fatalism and climate change?

- Belief that things are 'pre-ordained'
- Events are caused by a 'higher-will' or God (Ringgren 2014).
- Weather events viewed as caused by a higher power over which humans have little influence (Ringgren 2014; Misanya and Øyhus 2015).

# Maize in Bangladesh



- Agriculture is high risk → low adoption of costly new technologies
- Bangladesh's most rapidly expanding cereal.
- Maize is a 'high-investment-high-return' cash crop.
- Extreme weather is a threat to maize production.
- Farmers should *theoretically* have an intrinsic interest in crop insurance



# Maize: High profit but high risk



## Study objectives

1. Investigate if climate change skepticism, maize farmers' fatalistic beliefs, and insurance plan design influence interest in crop insurance in coastal Bangladesh
2. Understand farmers' preferences for index versus standard insurance

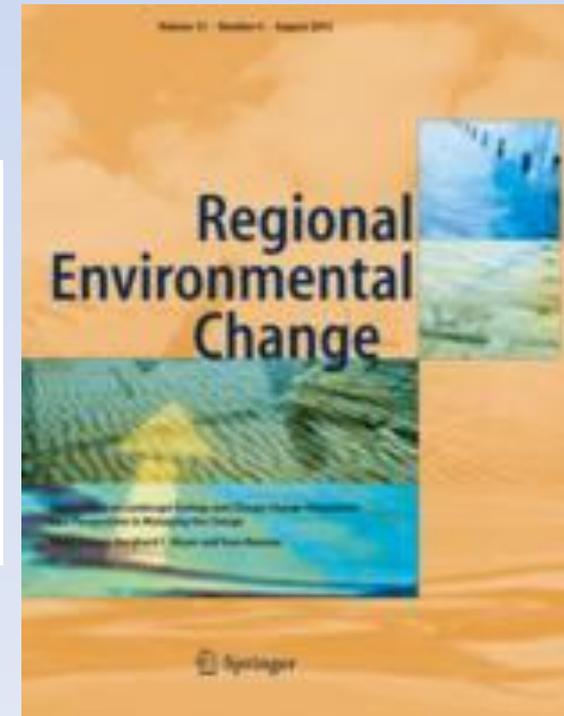
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ORIGINAL ARTICLE

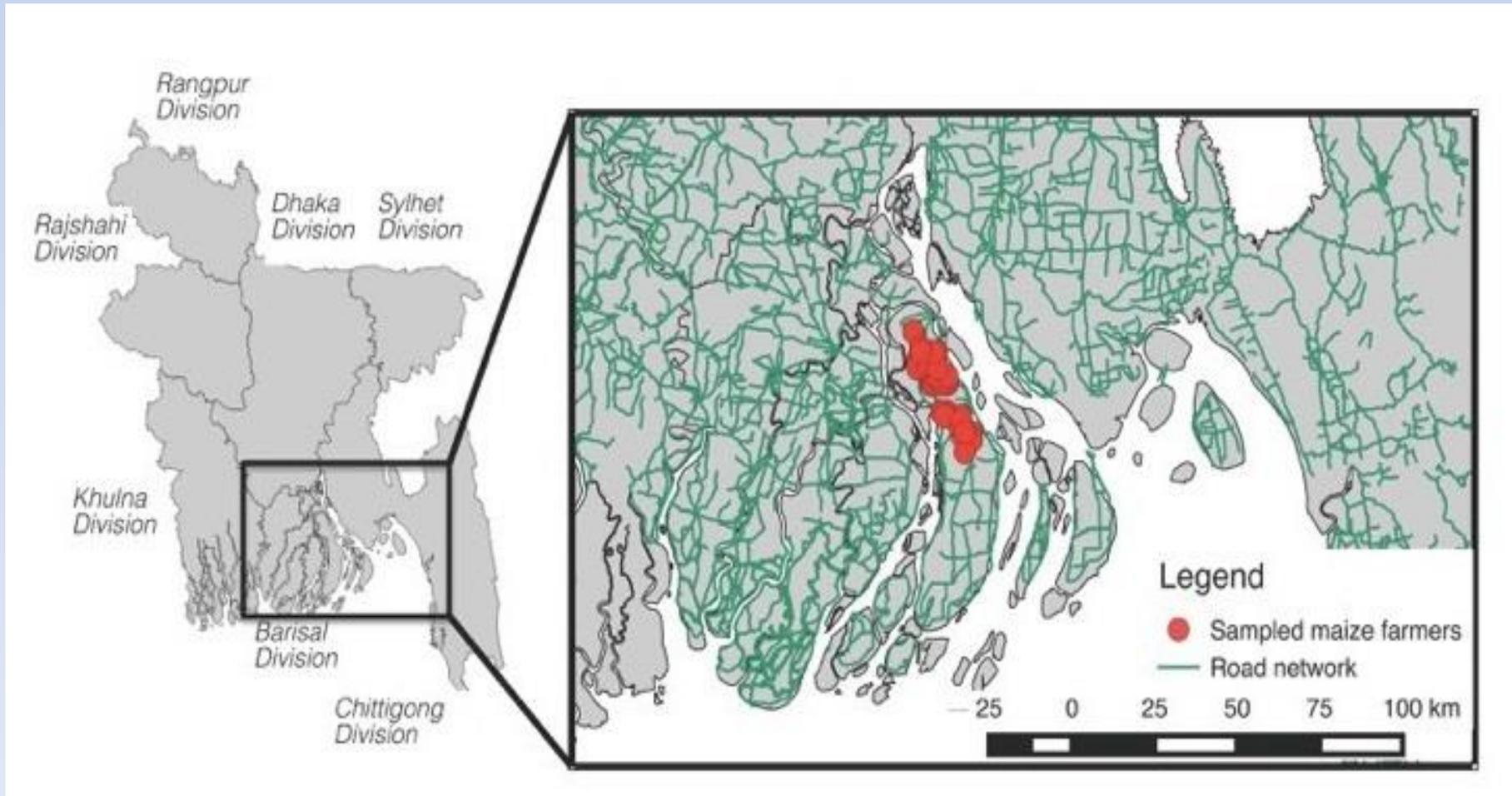
### Climate change skepticism and index versus standard crop insurance demand in coastal Bangladesh

Sonia Akter<sup>1,2</sup> · Timothy J. Krupnik<sup>3</sup> · Fahmida Khanam<sup>2,3</sup>



## Study location

- Bhola District: 1.78 million, 96% Muslim, literacy 43% (BBS 2013).
- 120 recently adopting maize farmers



## Methodology: Dimensions of climate change skepticism

- Farmer and agronomist focus groups to identify thresholds
- Skepticism is a multidimensional concept (Poortinga et al. 2011; Akter et al. 2012)
  - Trend skepticism → Disputes process of climate change
  - Attribute skepticism → Debates causes of climate change
  - Impact skepticism → Questions consequences of climate change
- Preliminary farmer survey
  - Sociodemographic and economic variables
  - Measures of risk aversion
  - Understanding + perception of climate change
    - Trend (perceptions of changes in climate)
    - Attribution (causes of changes in climate)
    - Impact skepticism (perception of hazards and risks)



# Methodology:

## Discrete choice experiment

Bundling	Attributes	Levels
<b>No Return</b>	Type	Index, Standard
	Hazard	Flood, Windstorm, Hailstorm
	Deposit <sup>b</sup>	100, 200, 300, 500, 800, 1000
	Guaranteed good time payment	0
	Bad time payment	1000, 1500, 2000, 3000, 5000
	Provider	Government Bank, NGOs, Private Bank, Private Insurance Companies, Islamic Organizations
<b>Partial Return</b>	Type	Index, Standard
	Hazard	Flood, Windstorm, Hailstorm
	Deposit <sup>c</sup>	500, 800, 1000, 2000, 2500, 3000
	Guaranteed good time payment	200, 800, 1800, 2000, 2500, 2800
	Bad time payment	2000, 3000, 4000, 5000
	Provider	Same as above
<b>Full Return</b>	Type	Index, Standard
	Hazard	Flood, Windstorm, Hailstorm
	Deposit <sup>d</sup>	800, 1500, 2000, 2500, 3000, 4000
	Guaranteed good time payment	1500, 2000, 2500, 3000, 4000
	Bad time payment	1800, 2000, 2500, 3000, 3500, 4000, 5000
	Provider	Same as above

# Methodology: Discrete choice experiment

1				
Insurance Type	Insurance Provider	Deposit (Per Bigha)	If hazard strikes	In case of no hazard
Option : A 	 সোনালী ব্যাংক লিমিটেড Sonal Bank Limited Gov't Bank	₹ 3000	 Maximum ₹ 4000	 ₹ 3000
Option : B 	 Grammen Bank BRAC NGO	₹ 500	 ₹ 2000	 ₹ 0
None				

Block AF.1



- Random utility model framework for choice experiment results

## Results and implications



- **Farmer respondent socio-demographics:**
  - 60% male, mean age 41 (20-70)
  - Low educational levels
  - 63% have no familiarity with insurance
- **Climate change skepticism:**
  - 85% of farmers observed climate change
    - Heavy monsoon, rabi season drought, earlier and higher pre-monsoon temperatures, frequent flooding
  - 85% believe in anthropogenic climate change
    - Remainder disagree or exhibited fatalistic beliefs
- **Comparing types of climate change skepticism:**
  - Impact skepticism significantly associated with fatalism
  - Half of respondents believe extreme weather are caused by divine will
  - Positive correlation (Cramer's  $V = 0.20$ ,  $p < 0.05$ ) between attribution and climate change concern

## Random parameter logit model results

- Wealthier households more interested in insurance than poor
- Lower insurance demand where premiums are high
- Standard insurance preferred over weather index insurance
- Bundling options not significant
- Significantly higher interest in wind than hail or other insurance types ( $p < 0.05$ ).

## Climate chance skepticism results

- Climate chance concern increases insurance preference ( $p < 0.05$ )
- Fatalistic beliefs about wind storms were less likely to opt for insurance ( $p < 0.05$ ), though no signal was found for waterlogging or hail storms

Variables	Description	Coefficient (SE)	SD (SE)
Constant parameter			
ASC	Alternative specific constant. Choice of an insured state = 1, otherwise = 0	-0.75** (0.33)	-
Random parameters			
$\beta_2$ (DEP) <sup>a</sup>	Deposit	-0.0015*** (0.0003)	0.0015*** (0.0003)
$\beta_3$ (BTP) <sup>a</sup>	Bad time payment	0.0003*** (0.0001)	0.0003*** (0.0001)
$\beta_4$ (GTP) <sup>a</sup>	Good time payment	0.0011*** (0.0002)	0.0011*** (0.0002)
$\beta_5$ (Standard) <sup>b</sup>	Standard damage verification process = 1, WII = 0	0.75*** (0.16)	0.60** (0.25)
$\beta_6$ (Private) <sup>c</sup>	Insurance provider is a private bank or private insurance company = 1, otherwise = 0	-0.67*** (0.24)	0.19 (1.30)
$\beta_7$ (Flood) <sup>d</sup>	Hazard covered by the insurance is flood = 1, otherwise = 0	0.08 (0.24)	0.018 (0.55)
$\beta_8$ (Wind) <sup>d</sup>	Hazard covered by the insurance is windstorm = 1, otherwise = 0	0.18 (0.23)	0.10 (0.80)
Model fit statistics			
Group number (N)		120	
Log likelihood		-472.67	
LR $\chi^2$		109.33 (df= 12, $p < 0.0001$ )	
McFadden pseudo $R^2$		0.10	

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.10$

<sup>a</sup> Following Hensher and Greene (2003), the coefficients of *Deposit*, *Bad Time Payment*, and *Good Time Payment* were assigned a bounded triangular distribution in which the location parameter is constrained and equal to its scale. Remaining parameters were assigned a normal distribution.

<sup>b</sup> Base category = WII (weather index insurance)

<sup>c</sup> Base category = government banks, NGOs

<sup>d</sup> Base category = hail

## Implications for crop insurance programs

- Most maize farmers linked trend and anthropogenic attribution climate change theses
- Fewer farmers were concerned that climate change will affect their livelihoods
- Preliminary evidence that impact skepticism is due to fatalistic beliefs
- Climate change attribution and impact skepticism, as well as poverty, negatively influence insurance demand
- Undermines crop insurance safety-net potential (Akter 2012; Akter et al. 2016; Binswanger-Mkhize 2012)

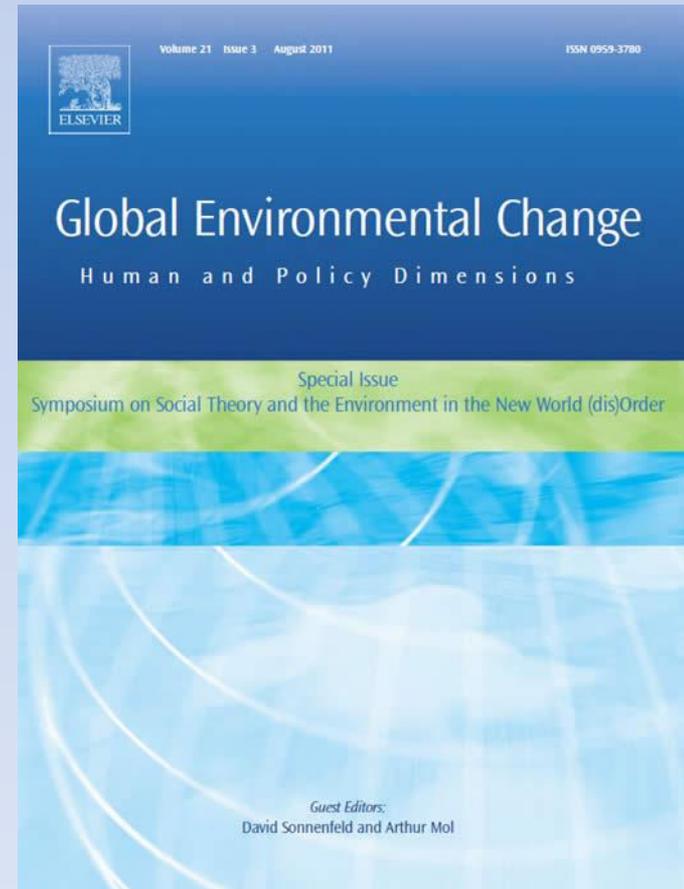




## Solutions for crop insurance providers and projects

1. ***Don't assume insurance demand:*** Climate science educational programs may boost farmers' understanding and potentially demand for insurance
2. ***Address other constraints:*** Financial literacy, poverty, insurance provider trust
3. ***Subsidy support:*** Private sector insurance programs may require underwriting
4. ***Perceptions and participation are key:*** pre-project investigation of (a) perceptions of insurance and climate change, (b) participatory insurance product design, could increase benefits from insurance programs

# Further reading on crop insurance in coastal Bangladesh



Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: [www.elsevier.com/locate/gloenvcha](http://www.elsevier.com/locate/gloenvcha)



The influence of gender and product design on farmers' preferences for weather-indexed crop insurance

Sonia Akter<sup>a,b,\*</sup>, Timothy J. Krupnik<sup>c</sup>, Frederick Rossi<sup>c</sup>, Fahmida Khanam<sup>b</sup>

**Open access!**

<https://www.sciencedirect.com/science/article/pii/S0959378016300310>

**Farmers' perceptions and priorities matter!**

Crop insurance programs are likely to benefit from programs addressing climate change skepticism, a lack of understanding of climate science and impacts on crops, and participatory insurance product design

