



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



State of the evidence and research gaps in agricultural insurance and climate risk

Berber Kramer, International Food Policy Research Institute (IFPRI)

International Microinsurance Conference
Lusaka, November 6 2018

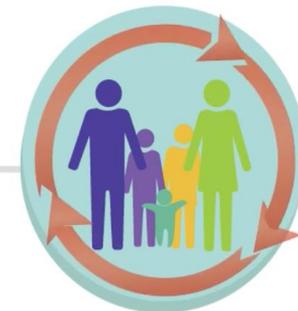


Impacts of weather shocks on livelihoods

LESS VULNERABLE



POVERTY CYCLE



LOWER INCOME

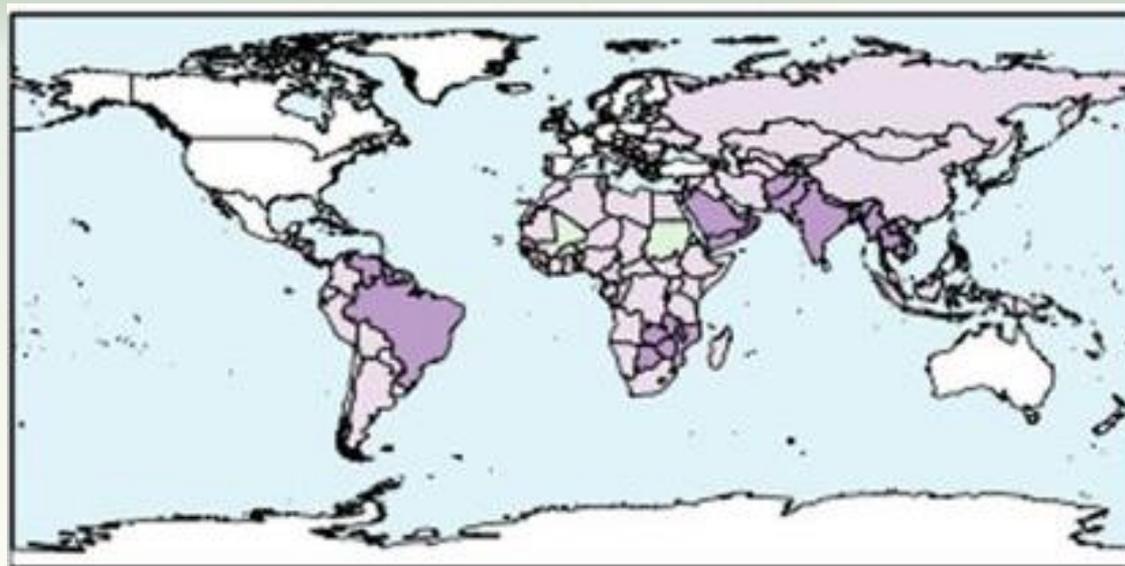
Global warming: Worsening vulnerability to food insecurity



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Change in Hunger and Climate Vulnerability Index at 2°C global warming



Source: Betts *et al.* (Phil. Trans. R. Soc. A, 2018).

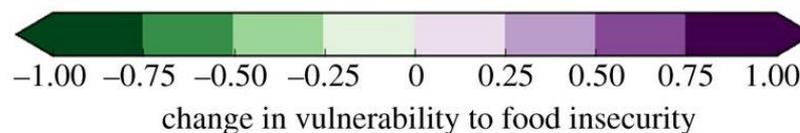
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PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A

MATHEMATICAL, PHYSICAL AND ENGINEERING SCIENCES

The Paris Agreement: understanding the physical and social challenges for a warming world of 1.5°C above pre-industrial levels

Theme issue compiled and edited by Dann Mitchell, Myles R Allen, Jim W Hall, Benito Mueller, Lavanya Rajamani and Corinne Le Quéré



Traditional indemnity-based insurance:

- High administrative and transaction costs.
- Asymmetric information between insured and insurer, which in turn gives rise to adverse selection and moral hazard.

Index-based insurance to overcome these challenges:

- Trials on weather index insurance show that index insurance **can** lead to higher investments in risky cash crops
- Weather index-based insurance in Ghana (Karlan *et al.*, 2014) and India (Cole *et al.*, 2014; Mobarak and Rosenzweig, 2014)
- Livestock insurance using remotely sensed vegetation index: Kenya & Ethiopia (Jensen, Barrett and Mude, 2015)
- Hybrid index product in Bangladesh (Vargas Hill *et al.*, 2019)



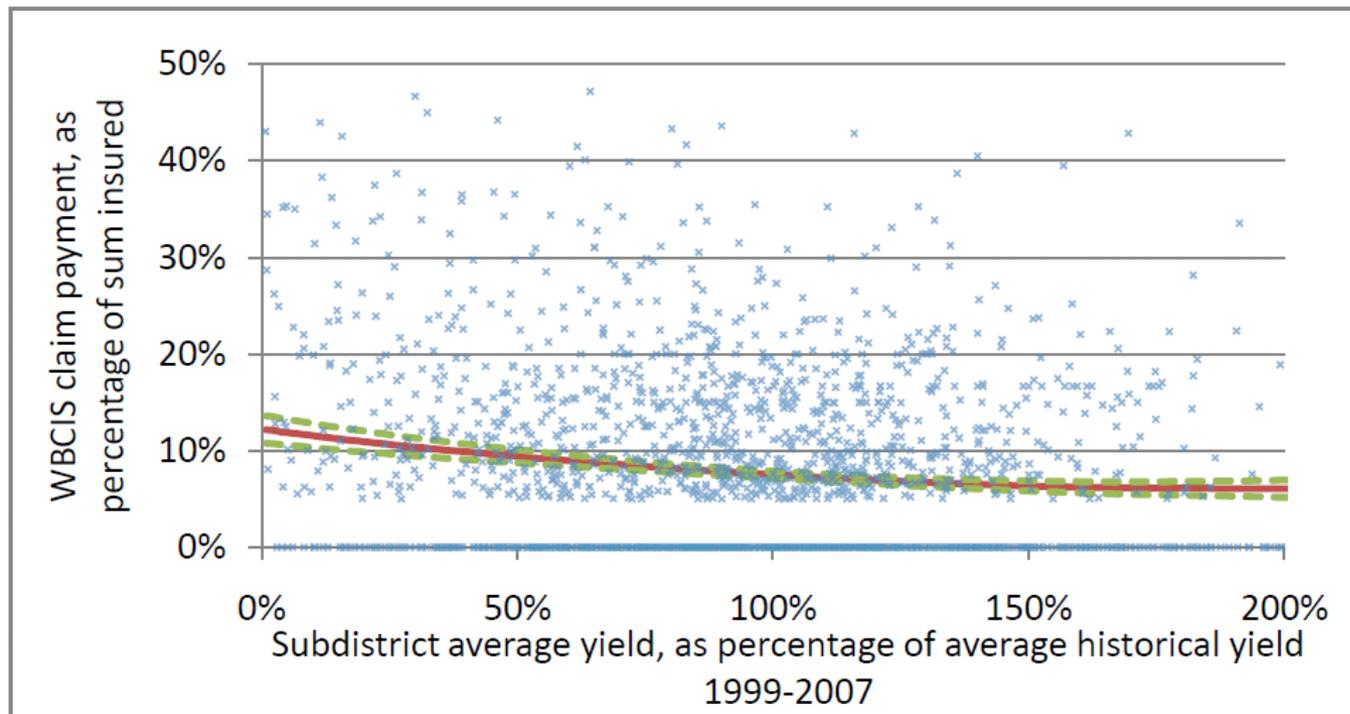
Yet, low demand even at low premiums



De Bock and Galade, 2012 (review); Cole et al., 2013; Mobarak and Rosenzweig 2014 (India); Karlan et al., 2014 (Ghana). Adapted from IPA.

Major challenge: Basis Risk

Weather based crop insurance payouts against yields in India



Note: The lines show the point estimate and 95% confidence intervals for an Epanechnikov kernel with a bandwidth of 0.8.

Source: Clarke, Mahul, Rao and Verma (2012). World Bank Policy Research Working Paper 5985

Innovations to reduce basis risk



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Three innovations in presentation today:

- Fail-safe contract design with audits (design risk)
- Ground pictures to reduce information asymmetries (spatial risk)
- Crop models for smarter index design (temporal risk)

Thursday session “Research for scaling agri insurance”

- Crowdsourcing to collect additional ground data
- Bundling insurance with stress-tolerant seed varieties
- Impact evaluations of innovations in agricultural insurance



Fail-safe contract design with audits

Reducing basis risk: Allowing farmers to request audits when index fails (Berhane *et al.*, 2015; Flatnes & Carter, 2016; Vargas Hill *et al.*, 2019)

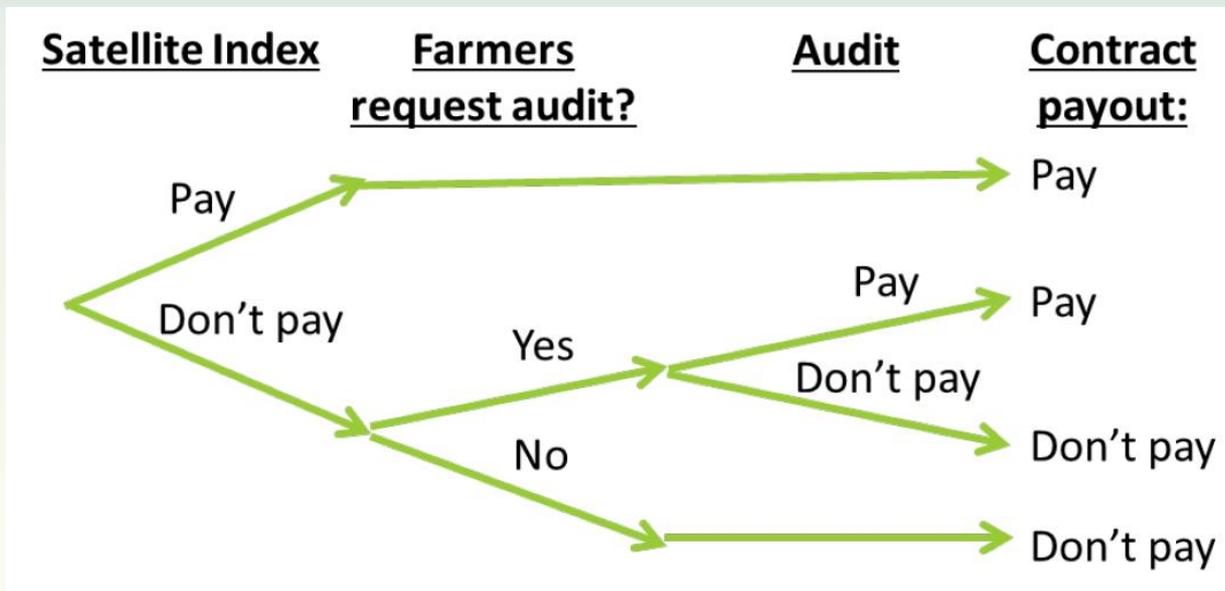


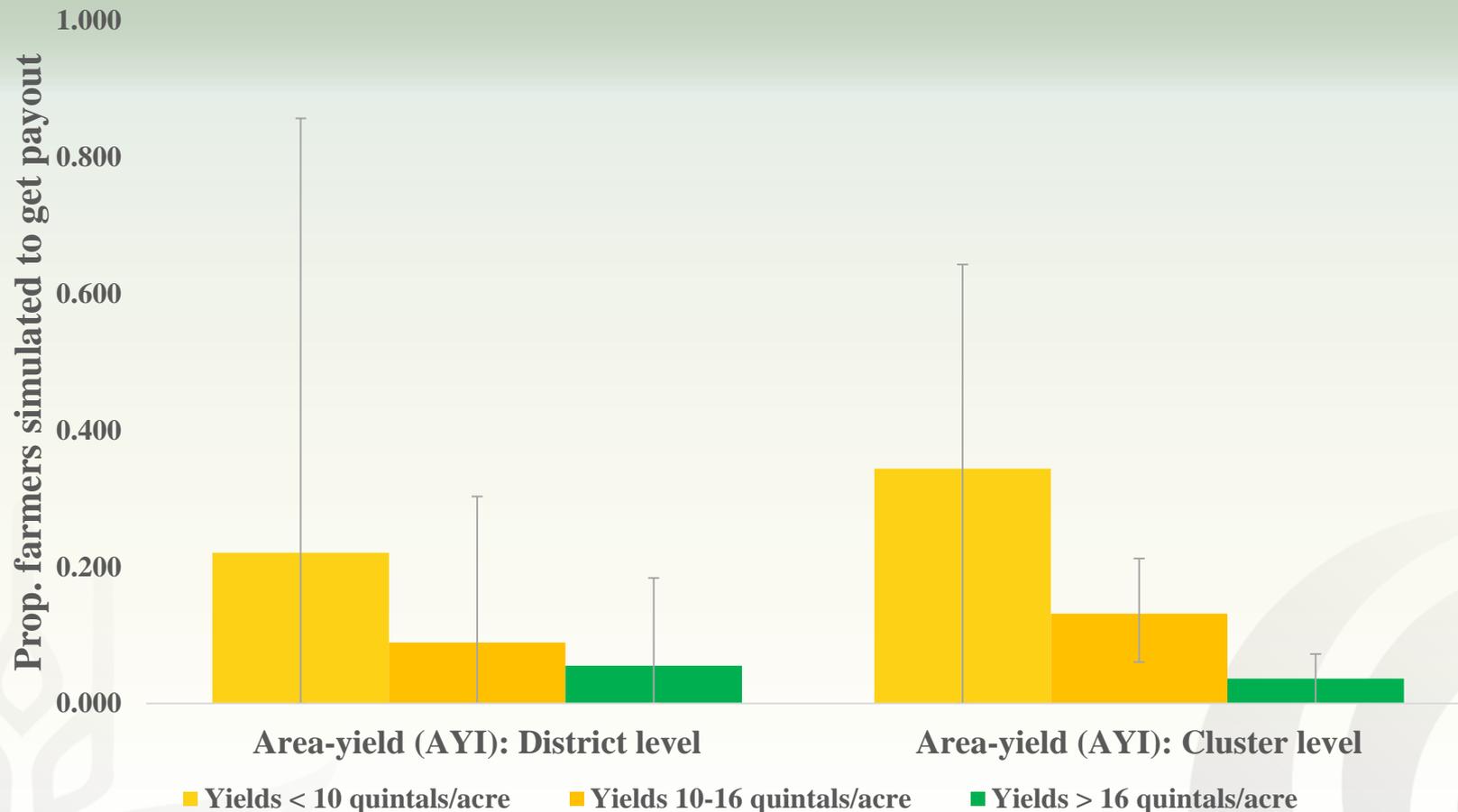
Figure adapted from Flatnes, Carter and Mercovich (2018), presented at ICAE 2018

Challenges:

- Cost of conditional audit and risk of delays
- Limited farmer engagement and participation
- Idiosyncratic risks that don't affect an area at large

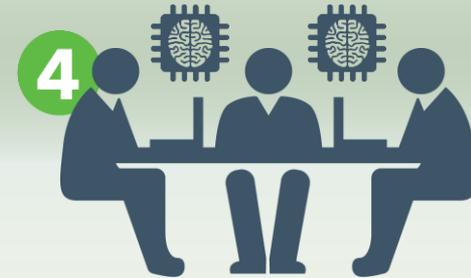
Basis Risk in Area Yield Insurance

Simulated area-yield based payouts against yield categories



Source: Crop cutting experiments data for 50 villages in Haryana and Punjab (Ceballos, Kramer and Robles, 2018).

Picture-Based Insurance (PBI)



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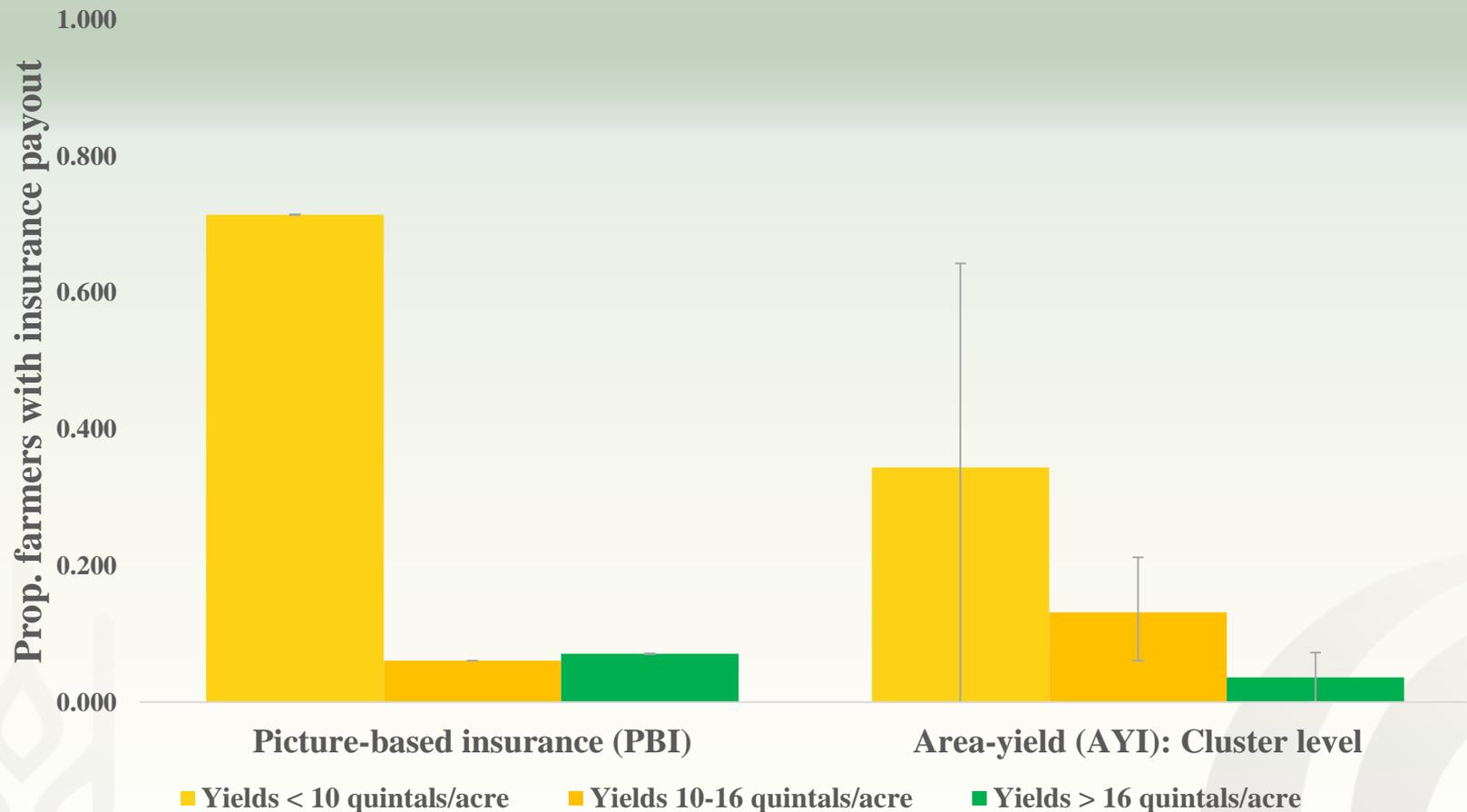
Degree of damage	0-19% (none/mild)	20-49% (moderate)	50-74% (severe)	75-100% (extreme)
% of sum insured	0%	35%	65%	100%



Experiment on PBI in northwest India



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Source: Crop cutting experiments data for 50 villages in Haryana and Punjab (Ceballos, Kramer and Robles, 2018).

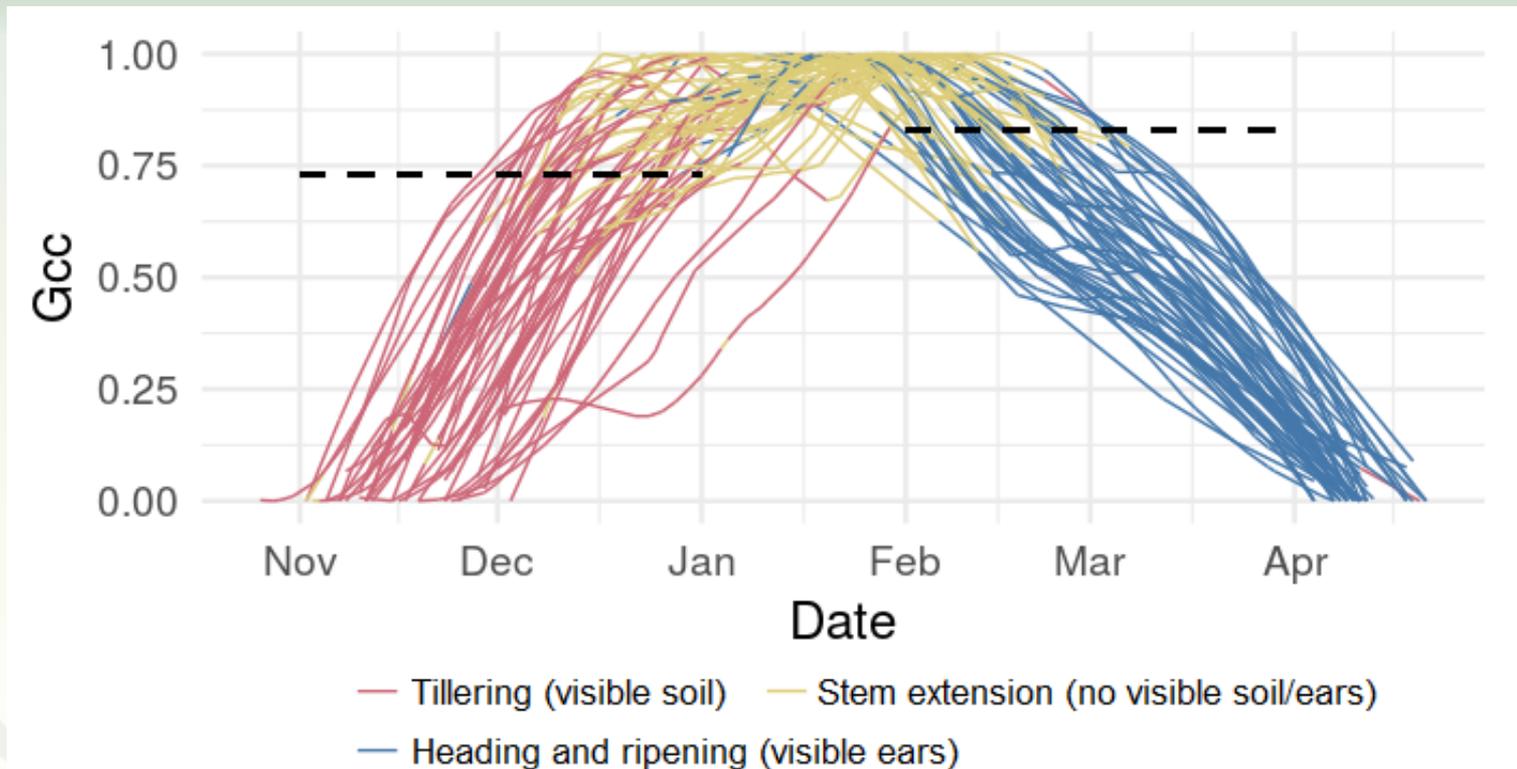
Crop models for smarter index design



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Feed observed growth stage and other agronomic information into crop models to predict weather-related production losses



Note: 'Gcc' stands for green chromatic coordinate, with its value normalized by the maximum gcc for the site. See details in Hufkens et al. (2018)

Research gaps for such innovations



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- Implications for **service quality** and **consumer demand**?
 - What are the estimated impacts (investments, income and assets, but also consumption, consumption smoothing, and ultimately welfare)?
- To what extent does use of technology affect **gender inclusivity**?
- Does technology give rise to new **distribution channels**?
 - New form of insurance to be offered by telecoms?
 - Bundling with digital credit and savings, mobile money?
- **Broader risk management**—how to avoid crowding out of risk prevention and climate adaptation / CSA?
 - Technology reduces information asymmetries: climate-smart subsidies?
 - Unlock credit required to invest in CSA practices and technologies?

Thank you!



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Questions & Answers

