

# EMERGING INSIGHTS

Managing Risk to Support Smallholder Farmers in South Asia and Sub-Saharan Africa:  
Evidence from the Agricultural Technology Adoption Initiative

## Agricultural Technology Adoption Initiative:

The Agricultural Technology Adoption Initiative (ATAI) has funded more than forty rigorous evaluations, the majority full-scale randomized controlled trials, addressing critical evidence gaps with robust, causal evidence. ATAI studies seek to advance practical understanding of the obstacles and opportunities critical to technology adoption for smallholders. The “Emerging Insights” series distills evidence from ATAI and complementary studies to broadly share the outcomes of the project as a means to inform programs and policy. The following brief focuses on mitigating agricultural risks.

### Context:

The systemic risks of agricultural production play an important role in farmers’ agricultural investment decisions. Weather, natural disasters, pests, and disease can jeopardize farmers’ ability to recoup their investments at harvest, and such risks can depress productive input use. Therefore risk-mitigating strategies for smallholders, such as insurance and stress-tolerant inputs, can impact yields and farmer welfare.

### Evidence-based insights:

*Limits to demand for standalone weather index insurance:*

- **Lack of commercial viability at market prices and lack of trust in insurance schemes limits take-up.** Index insurance products struggle to launch without heavy initial subsidies, and results are consistent with substantial lack of trust for index insurers ([Cole et al. 2013](#)) ([Mobarak & Rosenzweig 2012](#)) ([Cole et al. 2014](#)). Few products have succeeded in sustaining demand in the developing world with prices set at market rates (above actuarially fair prices); full market price typically yields an uptake of around 16%, and even a 50% subsidy only increases demand to 38% ([Mobarak & Rosenzweig 2012](#)) ([Karlan et al. 2012](#)). As a result, these products do not appear to be commercially viable as standalone products
- **Linking credit with insurance has mixed results, suffering from the same demand problems that have beset standalone index insurance.** The offering of indemnified loans that interlink an insurance product with credit appears promising, but demand for such loans has been shown to be surprisingly low in the few trials that have tested this mechanism ([McIntosh et al. 2013](#)) ([Gine & Yang 2009](#)) ([Karlan et al. 2012](#)) ([Karlan et al. 2010](#)).

## Are there strategies to address low demand for insurance?

- **Demand for insurance increases when farmers observe payouts over time.** Receiving payouts in the previous year has a strong effect on increasing subsequent demand, increasing demand by almost 30% ([Cai et al. 2010](#)) ([Cole et al. 2014](#)) ([Karlan et al. 2012](#)). However, not receiving payouts when a fair price has been paid has a strong negative effect on subsequent demand. Since the latter state is the 'normal' year for insurance consumers, this bodes ill for adoption of insurance and commercial viability.
- **Improving financial literacy and understanding of an insurance product increases take-up.** Financial literacy can mitigate the demand-dampening effects of high prices and low trust in index insurance ([Cai et al. 2013](#)) ([Gine et al. 2013](#)). In a study from Gujarat, researchers found that receiving an invitation to the financial literacy training increased take-up by 5.3 percentage points, but the cost of the training was more than three times the full cost of premiums ([Guarav et al. 2011](#)).
- **Adopting insurance can increase risk-taking in production decisions.** Where insurance projects have been successful in achieving widespread uptake (largely via free distribution) they tend to increase the appetite for activities vulnerable to rainfall risk ([Cole et al. 2013](#)) ([Mobarak & Rosenzweig 2012](#)) ([Gunnsteinson 2014](#)) ([Cai et al. 2010](#)) ([Cai 2013](#)), which has the (somewhat counterintuitive) effect of increasing the overall exposure of agricultural activity to rainfall volatility. Insured households are better financially insulated ([Janzen & Carter 2013](#)), but uninsured laborers may become more exposed as a result ([Mobarak & Rosenzweig 2014](#)).
- **New risk-mitigating crop varieties provide a promising alternative to insurance that can reduce farmers' risk and produce higher yields.** Similar to the impact of insurance on farmer decision making, risk-mitigating technologies such as submergence-tolerant rice allow households to make riskier production decisions, including input purchasing. In the event of climatic shock, farmers using risk-mitigating technologies and laborers on these plots are protected from great loss in absolute yields ([Dar et al. 2013](#)), whereas insured farmers that made riskier planting decisions face crop loss. Yield gains from risk-mitigating varieties can disproportionately benefit marginalized groups that cultivate less-desirable, risk-prone land

## Risk: Future research

Particular Research Questions of Interest: **Are there effective strategies to address basis risk?**

Basis risk is the risk that the official observation will not accurately predict a farmer's loss. The farmer experiences a poor harvest, but rainfall at the weather station is adequate, so there is no payout. More research is needed to understand how basis risk can limit take-up of index insurance ([Carter et al. 2014](#)).

- **Can groups insure against basis risk?**  
Since basis risk is largely covariate for a geographic area, one promising approach appears to be the provision of insurance to groups that are already providing informal risk pooling of idiosyncratic risks among their membership ([Dercon et al. 2012](#)). Index insurance is a complement to informal insurance only if the informal insurance has the purpose of smoothing idiosyncratic risks.
- **Can improvements in index design resolve basis risk?**  
Improved data could more closely align the experienced conditions of smallholders' plots with the measured conditions at data collection facilities (like rainfall at weather station locations) used to set the index ([Mobarak & Rosenzweig 2012](#)).

Given the evidence-based insights above, and current interest among related researchers and practitioners, ATAI suggests research emphasizing the following topics to further understand effective risk-reduction strategies for smallholders.

### Emphasized:

- Risk-protective seeds and technology (e.g. irrigation pumps, or other technologies reducing rain-fed reliance): achieve the benefits of insurance to the farmers while decreasing, not increasing, aggregate exposure of the agricultural system to weather.
- Meso-level insurance (financial institutions or governments as clients): focus on the supply side and provide insurance to institutions that are exposed to weather risk.
- Use of free insurance as a form of social protection: may be able to achieve a multiplier effect by releasing farmers' production decisions from risk constraints.

### De-Emphasized:

- individual-level, market-priced index insurance



## Evidence cited

- Cai, H., Chen, Y., Fang H., & Zhou L. A. (2010). Microinsurance, Trust and Economic Development: Evidence from a Randomized Natural Field Experiment. National Bureau of Economic Research (NBER) Working Paper 15396.
- Cai, J. (2013). The Impact of Insurance Provision on Households' Production and Financial Decisions. Working Paper. Munich Personal RePEc Archive (MPRA) Working Paper 46864.
- Carter, M. R., Laajaj, R., & Yang, D. (2013). The Impact of Voucher Coupons on the Uptake of Fertilizer and Improved Seeds: Evidence from a Randomized Trial in Mozambique. American Journal of Agricultural Economics, 95(5), 1345-1351.
- Cole, S., Giné, X., et al. (2013). "Barriers to household risk management: Evidence from India." American Economic Journal: Applied Economics, 5(1), 104-135.
- Cole, S., Giné, X., & Vickery J. (2014). "How Does Risk Management Influence Production Decisions? Evidence from a Field Experiment." Harvard Business School (HBS) Working Paper 13-080.
- Dar, Manzoor, Alain de Janvry, Kyle Emerick, David Raitzer, and Elisabeth Sadoulet. 2013. "Flood-tolerant rice reduces yield variability and raises expected yield, differentially benefitting socially disadvantaged groups." Scientific Reports 3, Article number 3315
- Dercon, S., Hill R., Clarke D., Outes-Leon I., & Taffesse A. (2012). "Offering rainfall insurance to informal insurance groups: evidence from a field experiment in Ethiopia." Journal of Development Economics, 106, 132-143.
- Giné, X. & Yang D. (2009). Insurance, credit, and technology adoption: Field experimental evidence from Malawi. Journal of Development Economics, 89(1), 1-11.
- Gaurav, S., Cole, S., & Tobacman, J. (2011). Marketing Complex Financial Products in Emerging Markets: Evidence from Rainfall Insurance in India. Journal of Marketing Research, Vol. 48(No. SPL), S150-S162.
- Gunnsteinson, S. (2014). Identifying Information Asymmetries in Insurance: Theory and Evidence on Crop Insurance in the Philippines. Working Paper.
- Janzen, S. & Carter, M. R. (2013). After the Drought: The Impact of Microinsurance on Consumption Smoothing and Asset Protection. National Bureau of Economic Research (NBER) Working Paper 19702.
- Karlan, D., Kutsoati, E., McMillan, M., & Udry, C. (2010). Crop price indemnified loans for farmers: A pilot experiment in rural Ghana. Journal of Risk and Uncertainty, 78(1), 37-55.
- [ATAI] Karlan, D., Osei, R. D., Osei-Akoto, I., & Udry, C. (2012). Agricultural decisions after relaxing credit and risk constraints. The Quarterly Journal of Economics, 129 (2): 597-652.
- [ATAI] McIntosh, C., Sarris A., & Papadopoulos, F. (2013). Productivity, credit, risk, and the demand for weather index insurance in smallholder agriculture in Ethiopia. Agricultural Economics, 44(4-5), 399-417.
- Mobarak, A. M. & Rosenzweig, M. (2012). Selling formal insurance to the informally insured. Yale University Economic Growth Center Discussion Paper.
- Mobarak, A. M. & Rosenzweig, M. (2014). Risk, Insurance and Wages in General Equilibrium. National Bureau of Economic Research (NBER) Working Paper 19811.