

Building Farmer resilience

NEW INSIGHTS FOR SCALABILITY

FROM 25 YEARS OF INDEX INSURANCE

PRESENTED BY

 COLUMBIA | SIPA
School of International and Public Affairs

CLIENT

Gates Foundation

KEY CONTRIBUTOR



ACROSS 26 INTERVIEWS · CONSISTENT PATTERNS

Interview findings: *key takeouts.*

01 DESIGN

Simple & Focused

One or few indexes (rainfall, extreme events). Accessible to farmers.

02 TECHNOLOGY

Affordable & Automated

SMS, digital wallets, automation drive adoption.

03 BUNDLING

Embed in services

Financial services, agri-inputs, or other insurance.

04 PROFITABILITY

Not an instant goal

Microinsurance cannot be expected to be immediately profitable.

05 GOVERNMENT

Beyond subsidies

Build ecosystem: educate, create programs, foster demand.

06 DATA

Satellites are central

Insurers require sufficient and reliable data to price & promote product.

07 BREAK-EVEN *Scale defines viability.*

THESE ARE THE CONSISTENT CHALLENGES ACROSS INTERVIEWS

To unlock scale, two critical questions *need to be answered.*

QUESTION 01

Value.

How are we verifying if products are solving a real problem?

Bundling can mask whether insurance itself has intrinsic value. Ineffective bundling can sometimes be a broken system. Farmers are sometimes unaware of national mandates.

QUESTION 02

Trust.

How are we ensuring that products are making meaningful payments when needed?

Encompasses trust, affordable insurance pricing and insurance providers creating meaningful benefits during risky years.

THE ULTIMATE BENEFICIARY HAS THE WEAKEST VOICE IN THE PROCESS

Is the farmer the *absent* stakeholder?

Across twenty-six interviews, four challenges appeared again and again, not in theory, but in the operational record of products already deployed at scale.

ZAMBIA • 2022

≈ 75% of farmers did not know they were insured.

Blakeley, S. L., S. Posey, K. Baylis, D. Osgood, and S. Sweeney. 2026. “Why Didn't I Get a Payout? Understanding Farmer Choices, Index Insurance, and Basis Risk.” *Applied Economic Perspectives and Policy* 1–11. <https://doi.org/10.1002/aep.70080>.

01 Limited or no input in product design

Many insurance companies deploy top-down. It is relatively uncommon to ask farmers which years were bad.

02 Often don't know they're insured

Government programs with automatic enrollment and premiums. In Zambia, ~90% of farmers did not know they had insurance after national rollout.

03 Usually front-loaded communication, then silence

Sold the product, and then little to no further channel of communication.

04 At times, inadequate payouts with no explanation

There is an expected payout vs actual payout mismatch between farmers and insurers.

SOLUTION1

Can farmer input *improve* index design?

THE PROBLEM

At scale, product design has often shifted from bottom-up to top-down. Insurance companies and consultants increasingly build indices using satellite data and actuarial models, with little or no direct input from farmers.

AN EXAMPLE

The Zambia Ministry of Agriculture conducted focus groups across ~1,000 villages. Farmers ranked historical bad years. Their rankings produced satellite indices that more accurately identified historically bad years compared to expert-built alternatives (Blakeley et al, 2026).

THE SOLUTION

Reintroduce farmer input into the product design process before any index is finalised — through structured focus groups or bad-year ranking exercises, which can be conducted at low cost.

SOLUTION 2

Could you check what happens *in the bad year?*

CURRENT PRACTICE

Investors have a clear mandate to track loss ratios and profitability.

In 2022 there was a meaningful drought. Profitable (70% Average Loss Ratio) benchmark products paid 2 to 4 times the premium (200-500% loss ratios for 2022)

ZAMBIA · 2022 DROUGHT

$\sim \frac{1}{3}$ premium repaid.

Substantial drought. Farmers were paid ~one-third of premiums. The government reconsidered the structure of the parametric insurance product. (Blakeley et al, 2026)

NEEDED CHECKS FROM INSURERS?

- 01 Whether payouts occur in bad years
- 02 Whether the product provides real value to farmers
- 03 Whether farmers understand or trust the product

Beneficial impact in the region equals trust to investors in the future.

Three approaches to answer *our questions*

APPROACH 01

FARMER —
BAD YEAR RANKING

APPROACH 02

GAP CALCULATION

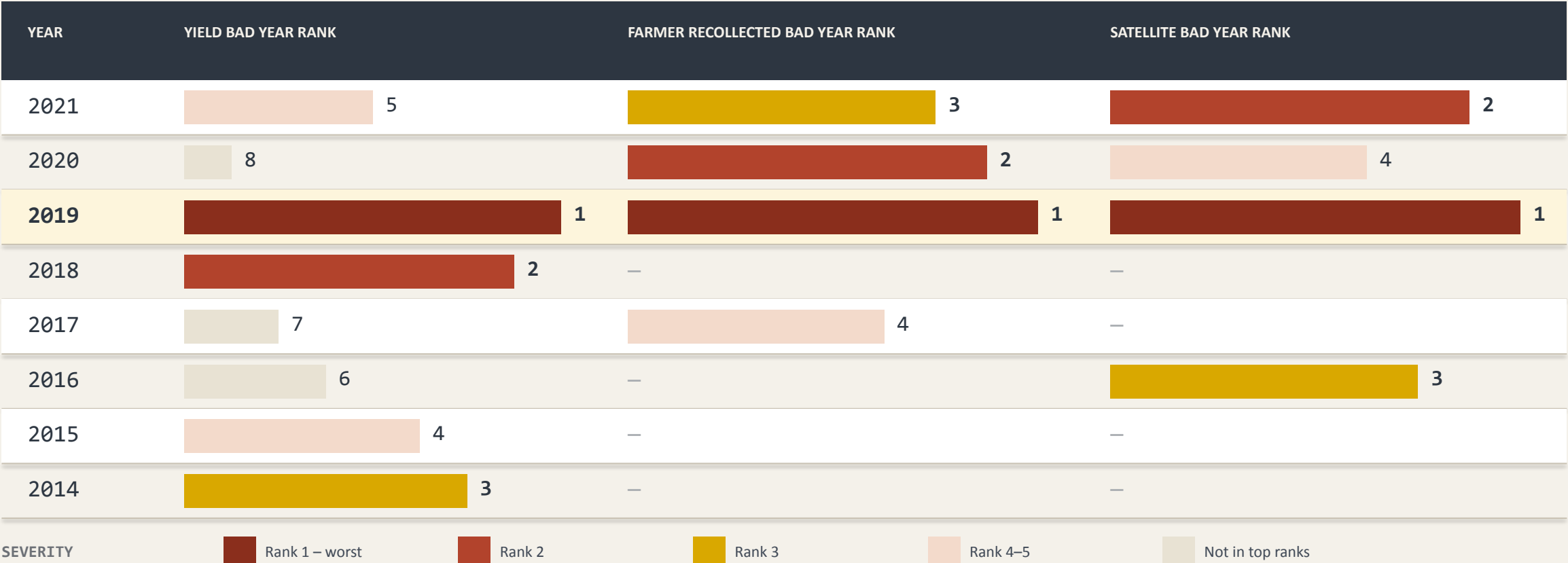
APPROACH 03

BUNDLE VALUE
ASSESSMENT

FARMER RANKING TOOL

Did the index pay out in the years *that actually mattered*?

Rwanda (Karongi) shows 2019 ranked as a bad year across all three data sources. (Vidal et al., 2025)

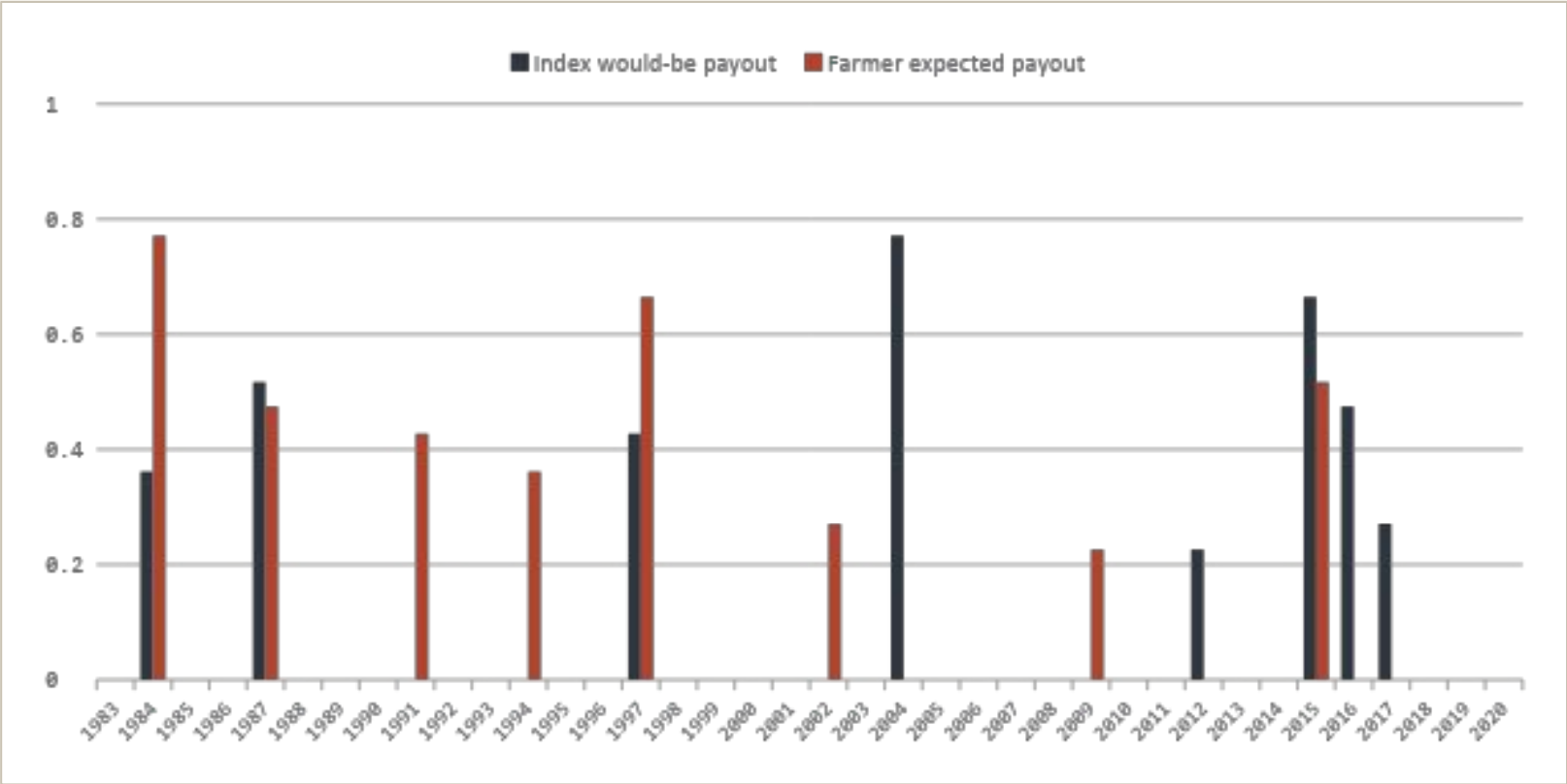


GAP CALCULATION

Where did payouts *align* with farmer needs?

The gap is the mismatch between what the index would have paid and what farmers expected in Ethiopia: 1983–2019. (Vidal et al., 2025)

ETHIOPIA · 1983–2020 · WEATHER-BASED ALIGNMENT VERIFICATION



SIMULATION · REPLICABLE FOR ANY PROGRAM

Any stakeholder with field presence can run this check — compare index trigger years against farmer recall to assess where value was delivered.

YEARS THAT WORKED
1987 and 1997 show both sources active in the same year.

YEARS WORTH INVESTIGATING
1991, 1994, 2002, 2009: farmer losses with no index payout.
2004, 2012, 2016, 2017: index payouts when farmers did not expect them.

Solution: A complementary fund could be created to close the gap. (Vidal et al., 2025)

NOT AS COSTLY AS YOU MIGHT EXPECT

This analysis is *replicable*.

HOW IT WORKS

Power Calculations

Power calculations determine the minimum sample needed for verification, so data collection is large enough to be credible but no larger than necessary. This allows practitioners to compare farmer-reported bad years with payouts and other data sources at manageable cost.

IRI • Columbia Climate School • 1AF Nigeria
Sampling Analysis

WHAT IT CHECKS

A Practical
Verification Step

This check can show whether payouts line up with the years that matter, where mismatch remains, and what it would cost to close the gap.

Method • applicable across geographies

WHO CAN RUN IT

Routine Field
Verification

At a reasonable cost, NGOs, governments, donors, or insurers could run this as part of routine monitoring. It should be treated as shared verification infrastructure, not a bespoke research project.

Cost • thousands per cycle • not a research project

DOES THE INSURANCE MAKE THE BUNDLE BETTER?

Bundling must add value, *not just volume.*

Some innovative examples from our interviews:

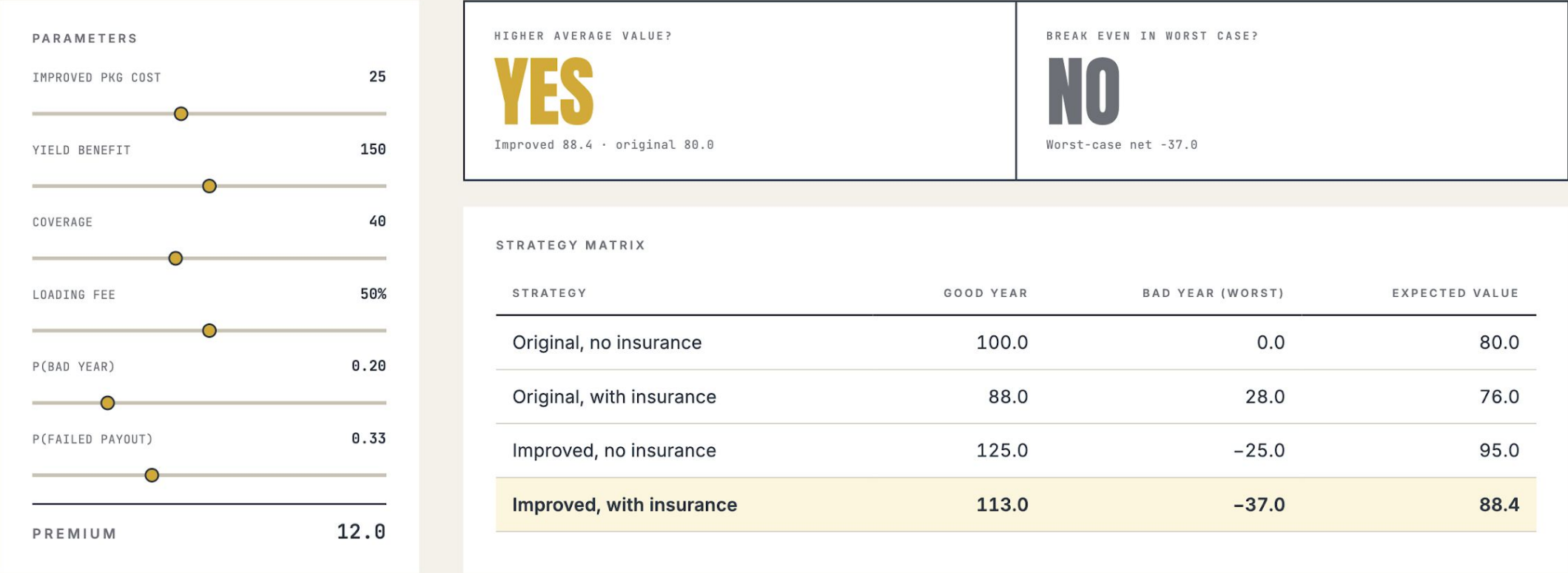
BUNDLE / FUNCTION	HOW IT WORKS	DOES THE INSURANCE MAKE THE BUNDLE BETTER?
MIC GLOBAL Income Protection	Bundle agricultural cover with health, hospitalization, and income protection. Household-level, not crop-only. Frequent small payouts come from health claims; the agricultural component is reserved for catastrophic years.	Yes — <i>by design.</i> Frequent health payouts build trust; ag cover holds reserves for the tail year. Components serve different risks.
INSURED COW Risk Reduction + Insurance	Vaccination is bundled with livestock insurance. Vaccination lowers the probability of animal death ex ante; insurance covers the residual risk. Each component strengthens the other.	Yes — <i>components reinforce.</i> Risk reduction lowers expected losses, so insurance priced against residual risk is more affordable and more credible.
CREDIT BUNDLING Insurance + Input Financing	Index insurance is attached to seasonal credit or input loans. The stated goal is to de-risk lending to smallholders so banks and input suppliers will extend credit they otherwise would not.	Open — <i>two questions first.</i> 1. Is credit still affordable once the premium is added? 2. Is drought actually the main risk keeping banks away?

COST/BENEFIT SCENARIOS Credit input bundling tool (next slide) models premium load, payout frequency, and net benefit to the borrower under each structure.

BUNDLE VALUE ASSESSMENT

Does the bundle actually *add up* for the farmer?

Adapted from D. Osgood · dosgoodcu.github.io/addupinsurance



BUNDLE VALUE ASSESSMENT

Does the bundle actually *add up* for the farmer?

Adapted from D. Osgood · dosgoodcu.github.io/addupinsurance

PARAMETERS

IMPROVED PKG COST

0

YIELD BENEFIT

150

COVERAGE

0

LOADING FEE

0%

P(BAD YEAR)

0.00

P(FAILED PAYOUT)

0.00

PREMIUM

0.0

HIGHER AVERAGE VALUE?

YES

Improved 150.0 · original 100.0

BREAK EVEN IN WORST CASE?

YES

Worst-case net 0.0

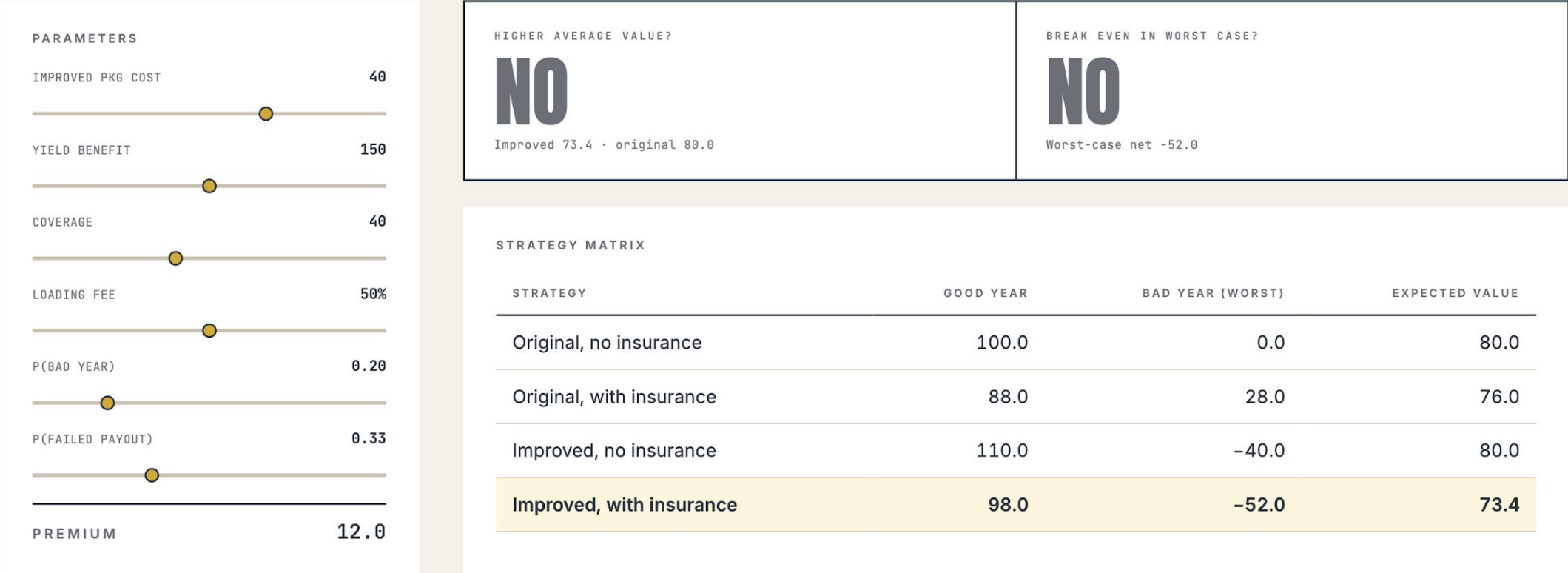
STRATEGY MATRIX

STRATEGY	GOOD YEAR	BAD YEAR (WORST)	EXPECTED VALUE
Original, no insurance	100.0	0.0	100.0
Original, with insurance	100.0	0.0	100.0
Improved, no insurance	150.0	0.0	150.0
Improved, with insurance	150.0	0.0	150.0

BUNDLE VALUE ASSESSMENT

Does the bundle actually *add up* for the farmer?

Adapted from D. Osgood · dosgoodcu.github.io/addupinsurance



NEW FINDING 4

AI is a tool, *not a substitute* for farmer insurance decisions.

AI CAN HELP ANSWER THE TWO CORE QUESTIONS

Value — *Are we solving a real problem?*

- Run breakeven and scenario analysis for cooperatives or at some aggregate level
- Stress-test whether insurance provides standalone value (vs bundling effects)
- Flag inconsistencies in product design or pitch assumptions

Trust — *Do payouts deliver when it matters most?*

- Compare farmer recall vs historical data (e.g., rainfall, yield)
- Identify mismatch between expected vs actual payouts
- Analyze payout performance in "bad years"

HOW AI FITS INTO THIS PROJECT

- Enhances data inputs for payout mismatch detection (ranking tool)
- Supports breakeven validation (calculator)
- Cross-checks farmer-reported outcomes with observed data

EXAMPLE APPLICATIONS

AI can detect mismatches between index triggers and actual losses at scale.

→ Projects like Ethiopia's R4 Rural Resilience Initiative aim to reduce mismatches between index triggers and actual farmer losses.

→ AI can support these efforts by comparing index triggers with farmer-reported outcomes to surface potential gaps at scale, especially where manual verification is not feasible.

AI can identify when payouts fail to reflect losses, especially in bad years.

→ Projects like Kenya's Index-Based Livestock Insurance (IBLI) program are designed to align satellite-based vegetation indices with livestock outcomes, particularly during drought conditions.

→ AI can support these efforts by benchmarking payouts against observed losses across regions and time to identify patterns and improve performance at scale.

AI identifies patterns — verification determines whether products actually work for farmers.

AI IMPROVES ANALYSIS, BUT CANNOT DETERMINE OUTCOMES

Verification is *essential* for AI impact.

LIMITATIONS

- ✗ Does not define whether insurance provides real value to farmers
- ✗ Does not determine if payouts are meaningful in bad years
- ✗ Does not replace farmer knowledge and local context
- ✗ Does not eliminate data gaps and access constraints

WHY AI ALONE IS INSUFFICIENT

- Optimizes models, not livelihood outcomes
- Limited access (~860M offline in Sub-Saharan Africa) constrains data and feedback
- May reinforce existing information asymmetries
- Identifies general risks (e.g., "basis risk exists") but not specific failures

AI can be a valuable tool, but the ultimate decision is with the people.

AI IMPACT

Farming-facing AI

- Facilitates data collection and communication via mobile phones and extension services
- Enables feedback loops between farmers and product providers

REAL-WORLD APPLICATION

AI analyzed unstructured data (e.g., local news, weather reports) to detect disaster events. In Bangladesh, combining news-based classifiers with satellite data improved detection of flood exposure compared to a single data source.

Pabari, Tellman, Mauerman, Osgood et al. (2023). Flood Event Extraction from News Media. arXiv:2312.14943

AT NATIONAL SCALE, NO ONE IS WATCHING

Who does this? The *governance gap*.

At pilot scale, communication and feedback loops existed between farmers, designers, and regulators. At national scale, those checks disappeared. Failures went undetected, with no mechanism to course-correct.

BEYOND REGULATION

An insurance regulator approves the product at release. No one is mandated to track whether it continues to deliver value in year three, year five, year ten — or to act when it does not.

WHAT'S MISSING AT SCALE

01**Ongoing performance monitoring**

Whether payouts continue to land in the years that mattered to farmers.

02**Farmer feedback channels**

A formal way for farmers to flag when products miss after rollout.

03**Course-correction authority**

A mandate to adjust products that underperform — not just approve them once.

04**Sanity checks at scale**

What pilots had: an entity that asked whether the product was still working.

THE IMPLEMENTATION ANSWER

A *governance framework* for scaled index insurance.

A public–private partnership — not a single entity — that institutionalises ongoing monitoring, feedback, and course correction in-country.

WHO SITS AT THE TABLE

INSURANCE REGULATOR	Approval, solvency, market conduct.
AGRI DEVELOPMENT BODY	One step removed from sales — tracks inputs, outcomes (e.g. ATI in Ethiopia).
GOVERNMENT MINISTRIES	Agriculture and finance — align with national programmes and subsidies.
PRIVATE INSURERS/BROKERS	Such as Pula, MIC Global, and others — deliver and adjust the products.

WHAT THEY MONITOR

APPROACH 01
Farmer bad-year ranking
<i>Verify farmer voice is reintroduced at every contract cycle.</i>
APPROACH 02
Gap calculation
<i>Detect payout-vs-need mismatches across years and regions.</i>
APPROACH 03
Bundle value assessment
<i>Confirm insurance is enabling — not masking — broader value.</i>
PRECEDENT <i>Central American coffee institutes (Instituto del Café) — exporters, producers, ministries, and the central bank at one table.</i>

ETHIOPIA · ATI + Insurance Regulator + Insurers

18 UNIQUE INSTITUTIONS · 6 STAKEHOLDER CATEGORIES

Stakeholder *meetings.*



— CAPSTONE FINAL DELIVERABLE

Thank *you.*

TEAM

 COLUMBIA | SIPA
School of International and Public Affairs

Carlos · Dean · Irra · Jenna · Lara · Mauricio · Yiran

CLIENTS

Gates Foundation

KEY CONTRIBUTOR

