The Need for Quality Certification for Index Insurance

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Workshop on Index-based Agricultural Insurance in Mozambique
Maputo, 31 August 2018

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- The fact that Index Insurance makes payouts based on an index related, but not identical to farmer losses is its:
    - *Greatest strength* (selection, moral hazard & transactions cost advantages); &,
    - *Greatest weakness* (contract failures unavoidable)
- Let's look at why this weakness is such an important problem and consider what to do about it

The Index Insurance Quality Problem

- Like hybrid maize seeds, there are 2 important characteristics of quality index insurance contract :
    - Quality is a hidden trait (that is, the pastoralist pictured in the prior slide cannot look at the contract paper & tell if it will protect her)
    - High quality is more costly to develop and supply high quality than low quality
- Unlike certified hybrid seeds:
    - No defined & enforced quality standards (akin to germination & yield tests for seeds)
    - Takes many years for farmers to discern quality (even harder than for maize seeds)
- Given these characteristics, economic theory suggests unregulated market can reach a junk equilibrium with low quality insurance and low demand (see Clarke and Wren-Lewis 2013)
- Moving forward with an effort to certify index insurance quality in East Africa (QUIIC program)

Defining Index Insurance Quality

- Whether quality is certified by insurance regulatory authorities (like maize seed) or whether it is certified by an independent private lab (akin to ISO or the Underwriter Labs for electrical devices), we need a clear, conceptually sound minimum quality standard
- Can define a Minimum Quality Standard (MQS) as:
  - The expected economic well-being of the insured is no lower with the insurance than without the insurance
  - More formally, the 'certainty equivalent' of the insured's income stream with insurance is no lower than the certainty equivalent of her income stream without insurance
- So should the farmer go it alone or buy index insurance?
- First, use a simple numerical example to explain the quality problem and a minimum quality standard
- Later give a real world examples of measuring and testing to see if a contract meets the MQS
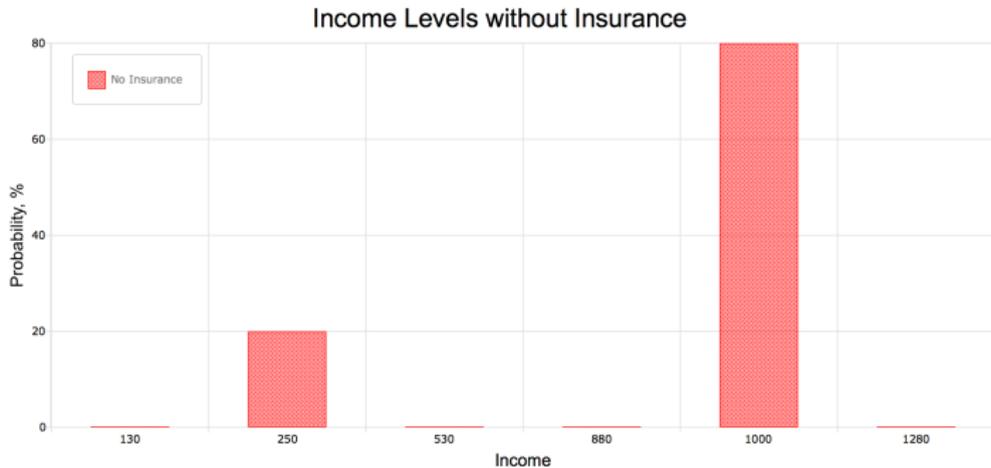
Go it Alone or Buy Insurance?

- *Is the stabilization effect of insurance worth the lower income?*
  - It can be if a dollar in times of stress is worth more than a dollar in times of plenty?
  - In this case, will a farmer give up a $1.50 in times of plenty to have $1 in times of stress?
- Economists have a standard way of thinking about and measuring this: a person with higher "risk aversion" is willing to give up more in times of plenty to have that $1 in times of need
- Despite its advantages, two potential weaknesses of index insurance:
  - False negative: fails to pay when losses occur, implying that the worst thing that can happen was made worse
  - False positives: farmer paid a $1.5 to get $1 when the state of the world was good and a dollar was not worth more than a dollar
- Both types of failures lessen the value of insurance as we can see graphically with simple example

A Stylized Agricultural Setting

- Let's assume that a farm household can experience either a good year or a bad year:
  - Good years happen 80% of the time and the household earns $1000
  - Bad years happen 20% of the time and the household earns only $250
- The farm household can either go it along and absorb this risk, or it can buy an insurance contract designed to pay the family $400 in bad years
  - Let's initially assume a perfect insurance contract that always works, never fails and has zero basis risk
  - The "pure" or "actuarially fair" premium for this insurance will be the probability a payment is made (20%) times the amount paid ($400): $20\% \times \$400 = \$80$
  - Let's assume that the market price of the insurance after a 50% markup (reinsurance, taxes, marketing and admin costs) will be $150\% \times \$80 = \$120$
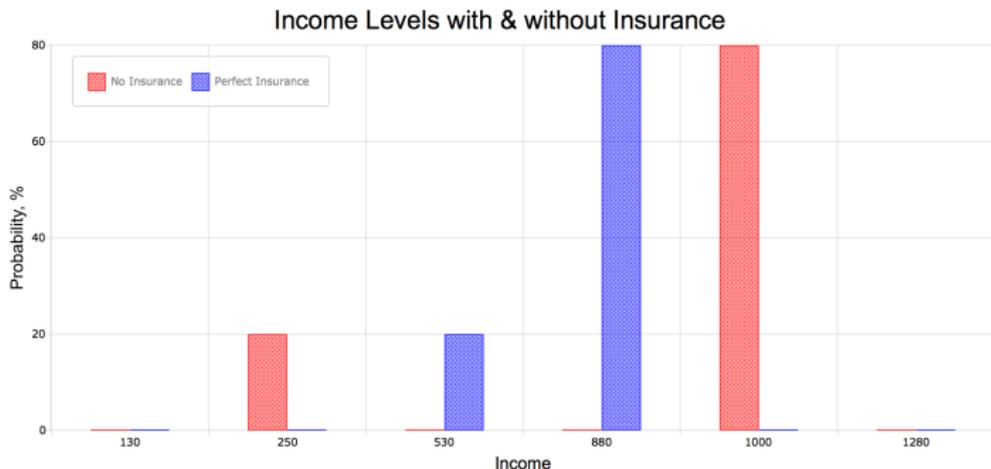
# Stylized Agricultural Setting

Go It Alone or Buy Insurance?

- The question we want to ask is:
  - *Would the farm household be better off going it alone without insurance, or would they be better off with insurance?*
- If the household would be better off economically buying insurance, then we will say that the insurance contract meets the Minimum Quality Standard (MQS)
- Let's look at a picture to fix ideas:

Go it Alone or Buy Perfect Insurance?


Income Levels with & without Insurance

- Note that without insurance, average household income will be $850
- With perfect insurance, average income will be $810 (a ~5% decrease)
- *Is the stabilization effect of insurance worth this lower income?*
- Using our stylized agricultural economy, we can answer our core question for perfect insurance assuming a moderate level of risk aversion

Perfect Insurance Exceeds the MQS!


Quality Standards for Index Insurance
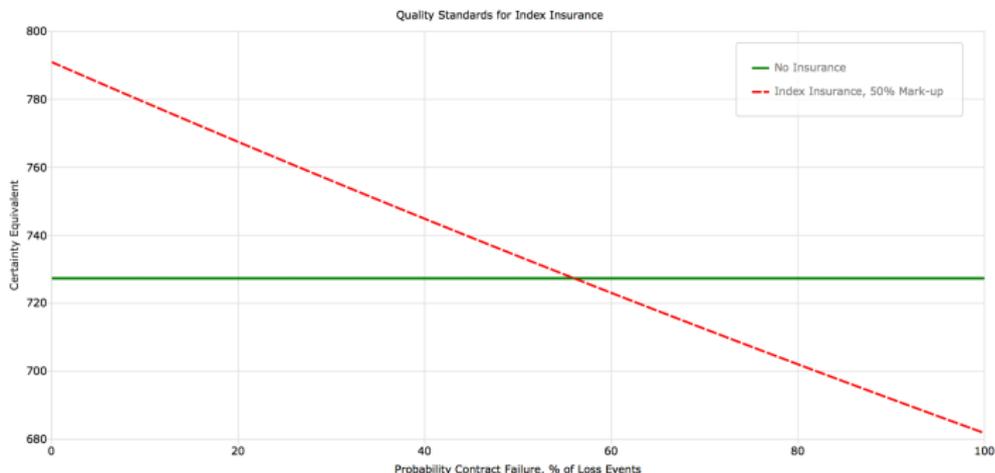
- Perfect insurance has zero failure probability
- Measured well-being in certain income equivalent (*e.g.*, the go it alone strategy has an average income of $850, but its risk-discounted certainty equivalent is only $730)

Go it Alone or Buy Index Insurance?

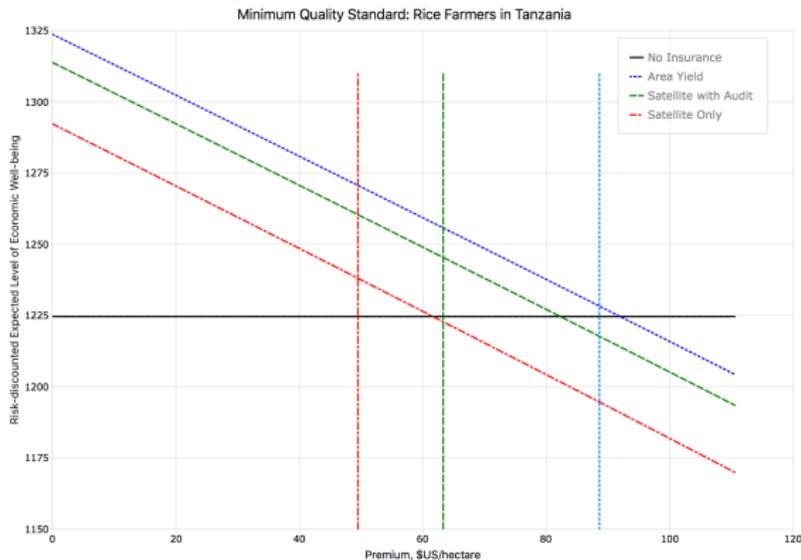Income Levels with & without Insurance
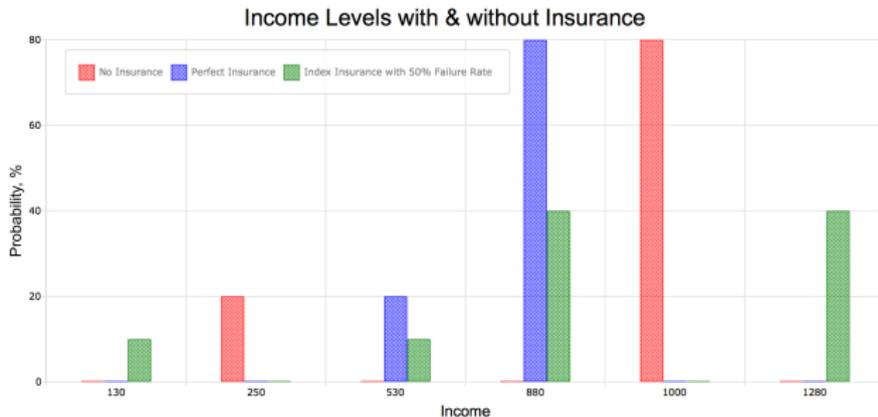
- Note that the worst thing that can happen gets worse with index insurance
- Note also that money is transferred from high value bad years to low values good years
- This is not free money! The farmer paid $1.50 for every dollar received, with a fraction of the dollars coming in bad years when the farmer really needed that money
- *So Is lower income worth the stabilization effect of INDEX insurance?*

Index Can Exceed the MQS if Failure Rate Not Too High
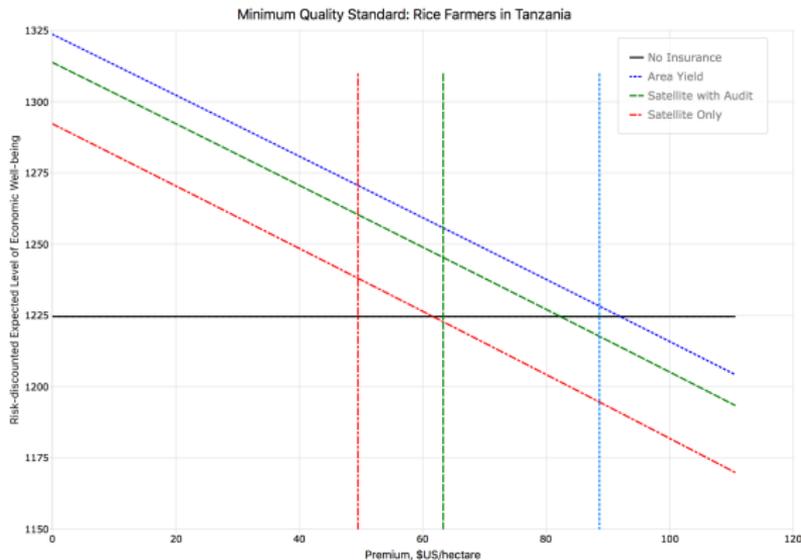

Quality Standards for Index Insurance
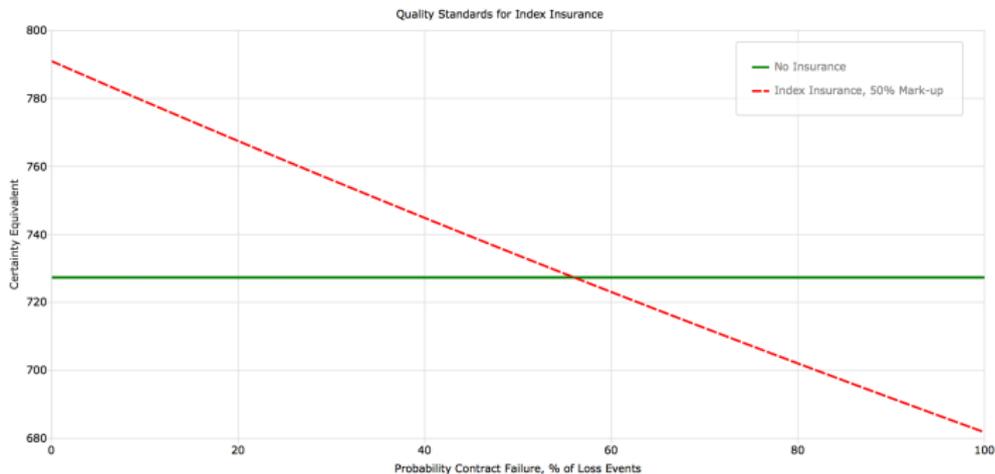
- In this example, if failure rate approaches 50%,, the farmer is better off going it alone
- Is 50% a high failure rate–not in the world of rainfall contracts
- Certification of MQS is needed

MQS in the Real World

Minimum Quality Standard: Rice Farmers in Tanzania

- No Insurance
- Area Yield
- Satellite with Audit
- Satellite Only

- Average rice farmer in northern Tanzania produces about \$1400/hectare in gross income
- Adjusting for the riskiness of production, the certainty equivalent value of this production is \$1225
- Would the farmer be better off with an area yield contract that:
  - Pure premium of \$67/hectare

Minimum Quality Standard: Rice Farmers in Tanzania

- No Insurance
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- Satellite Only

- Consider 2 alternative contracts:
    - pure satellite contract, with modest failure rate ($50 to implement)
    - Satellite contract with fail-safe audit ($62 to implement)
- Satellite contract with fail-safe audit wins the horse race and passes

Moving Forward Quickly with QUIIC

- Just received funding to create a Quality Index Insurance Certification program in East Africa:
  - QUIIC Board comprised of private and public sector representatives who will own and bestow the QUIIC mark
  - QUIIC Technical Lab that will provide arm's length certification services
- Partner for the QUIIC Lab will be the Regional Center for Mapping Resources for Development (RCMRD) in Nairobi. Operated with support of NASA, RCMRD has the remote sensing and data analysis skills to provide certification and contract services
- Mozambique is part of RCMRD's regional mandate!
- Stay tuned!

- Badly designed contracts can hurt not help the farmers they are supposed to protect
- An unfortunately large number of examples of this having happened
- Time to get serious about quality before this promising development tool is undercut by sloppy design and failure!