Disaster Risk Finance for Agriculture

Module 5

Implementing a Financial Protection Scheme For Agriculture

Disaster Risk Financing & Insurance Program

SUPPORTED BY WORLD BANK GROUP

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Structure of Webinars

Total of 8 Factsheets & 90-minute Webinar for each Factsheet

Different guest speakers

Live audience polls & interactivities: Please participate

Q&A: Please share your questions via chat

Breakout sessions at the end of each Webinar: Please register

Certificate of participation from the World Bank*

* Based on attendance & participation.

Certificate from World Bank

Participants will have an opportunity to obtain "Certificate of Informed Policymaker" from the World Bank on successful completion of following criteria:

Participation Certificate:

Participants need to attend 4 out of the 8 webinar sessions and complete a short survey/quiz.

Program Completion Certificate:

Participants need to attend 7 out of the 8 webinars and complete a short survey/quiz.

Webinar Road Map

SESSION

1. Introduction to DRFA
2. Reducing & Preparing for Risks in Agriculture
3. The Role of Financial Market Solutions for Building Resilience to Shocks in Agriculture
4. Structuring an Agriculture Financial Protection Scheme
5. Implementing an Agriculture Financial Protection Scheme
6. Risk Finance Instruments 1 – Agricultural Insurance
7. Risk Finance Instruments 2 – Risk Retention Mechanisms for Agriculture
8. Risk Finance Instruments 3 – Macro and meso-level Risk Transfer for Agriculture

Overview of fact sheets

FACT SHEET #

1

- Four core principles of DRF, risk layering, and types of DRF instruments
- How agriculture fits in the broader DRF picture

2

- Introduction to risks facing rural households and agri sector
- How farmers, businesses, govts can reduce risks
- How farmers, businesses, govts can prepare for risks
- Outline a comprehensive approach to reduce and prepare for risks

3

- Benefits of greater access to finance including: enhanced resiliency of the agricultural sector, rural livelihoods, and economies
- Financial tools available including: credit, savings, insurance, transfers, climate-smart agriculture financing, and value-chain finance and when to use these tools

4

- Different aims of DRF and who to protect
- Potential objectives and priorities for covering certain risks
- Disaster risk financing instruments in agriculture sector – what exists
- Importance of pre-planning the financed disaster response and delivery channels

5

- Different stakeholders in implementing a DRFA scheme
- Typical roles and responsibilities of the public and private sector in supporting and developing DRFA
- Importance of monitoring and evaluation

6

- Policy objectives of agriculture insurance
- Agricultural insurance products – key features, benefits, constrains of index insurance
- Public-private partnership in agriculture insurance – Overview and delivery models

7

- Sovereign risk retention mechanisms for agriculture
- Structuring risk retention instruments – key features and things to consider

8

- Overview and objectives of macro-level risk transfer for agriculture
- Structuring a macro or meso-level risk transfer solution – alignment with other financing instruments and other things to consider

Word Cloud 1: Where are you currently based?

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QR Code:

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Poll 1: Recap

What was the last Webinar about?

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What was the last Webinar on Module 4 about?

- How to utilize the decision-making framework in designing a financial protection scheme, focusing on agriculture risks
- The operational framework on how to implement the decisions using different instruments and contingency plans
- I did not attend the webinar
- I don't remember

Recap Module No. 4

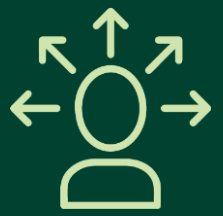
Key takeaways of Module 4

- When governments are prepared it is easier to implement quick, timely and quality interventions
- One size does not fit all, it is unlikely that one instrument will meet all objectives, a risk layering approach is optimal
- Design of instruments and getting the right mix of instruments is important, instruments at the macro, meso and micro levels can be considered when building solutions to meet the needs of different end beneficiaries
- Contingency plans outline the key processes needed to ensure beneficiaries receive the right support at the right time. Practical exercises like simulations can turn planning documents into true preparedness, by working out any challenges in advance of a crisis
- Financial protection schemes require review over time to ensure impact has been met and learnings can be taken on board, building M&E into the operational framework is vital in doing this

Content

1. **Introduction to Module 5**
2. **Kenya Case Study**
   - How did the different programs fit together under the overall DRFS
   - What were the challenges and learning's?
   - How did public, private partnerships support implementation
3. **Monitoring and Evaluation**

Module 5 objectives are:



1. To understand the **decision-making framework** of structuring a financial protection scheme and presents how it was implemented in practice, via case studies

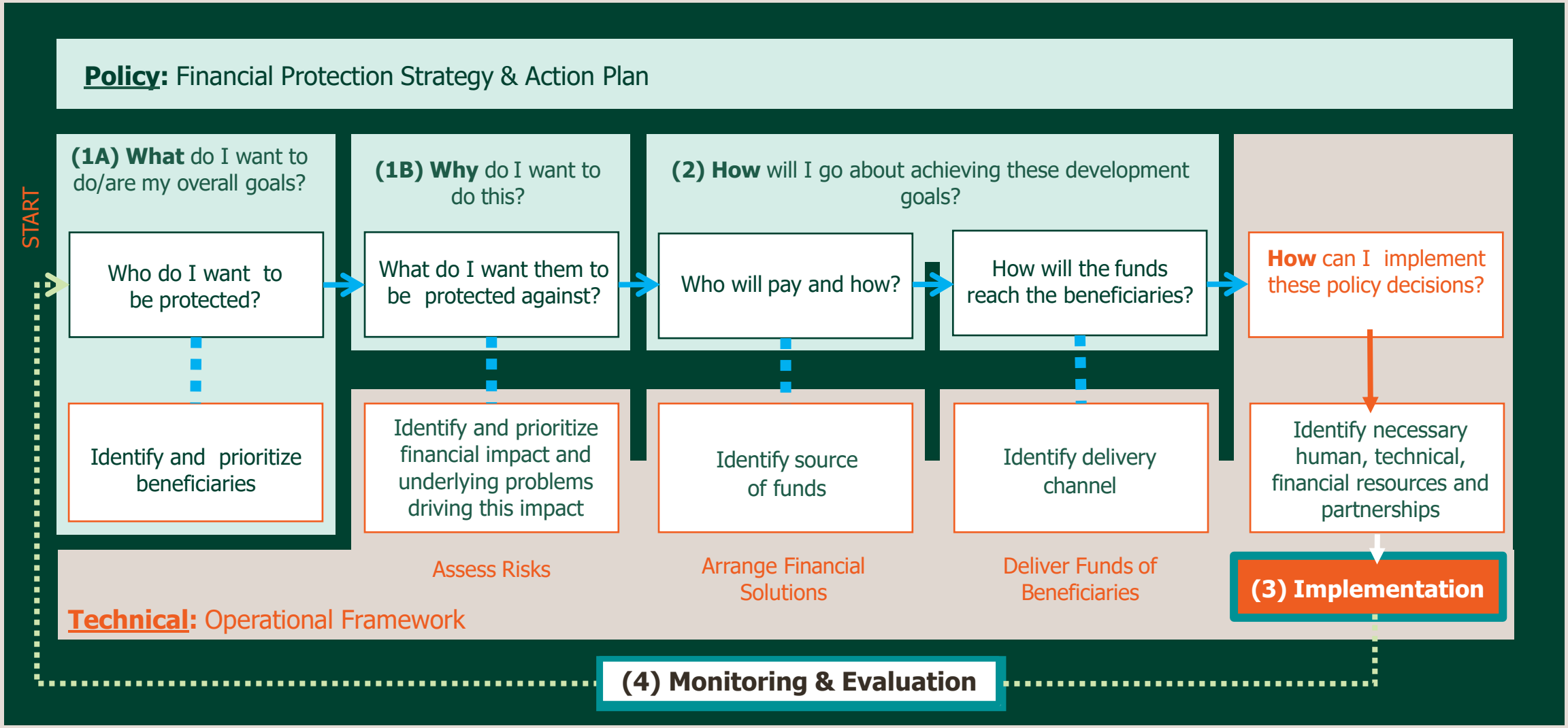
2. To be aware of **lessons learned and challenges** of implementing financial protection schemes in practice

3. Understand how **public private partnerships** can support implementation of financial protection schemes

4. The importance of building and embedding a **monitoring and evaluation framework** within a financial protection scheme for agriculture

Implementing a financial protection scheme for agriculture

Decision making framework



Kenya
A Case Study

KENYA: SETTING THE SCENE (2012)

EXPOSURE

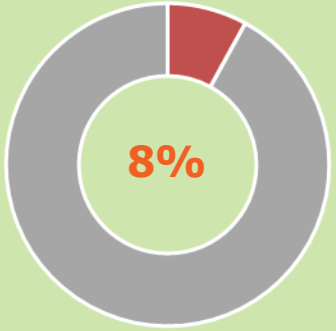
High Vulnerability To Climate Shocks

of poor ASAL population depends on livestock for livelihood

3-4 mn

Kenyans affected annually by climate shocks

High Fiscal And Economic Cost

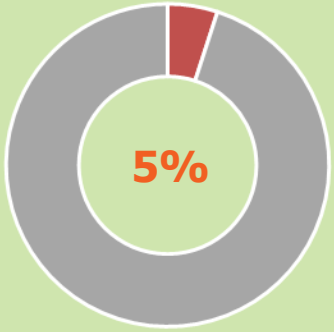


GDP drought cost every 5 years

K9.2 bn pa

Ave drought response in 2007/08 and 10/11 (1.5% of 07/08 expenditure)

Increased Risk Of Conflict



Increased odds of conflict due to droughts

- Droughts exacerbate existing conflicts
- Agriculture-dependent population most at risk

RESPONSE

Inefficient Fiscal And Aid Response

$325mn P.A

Ave humanitarian assistance provided 2010-2019

Can arrive late and is insufficient

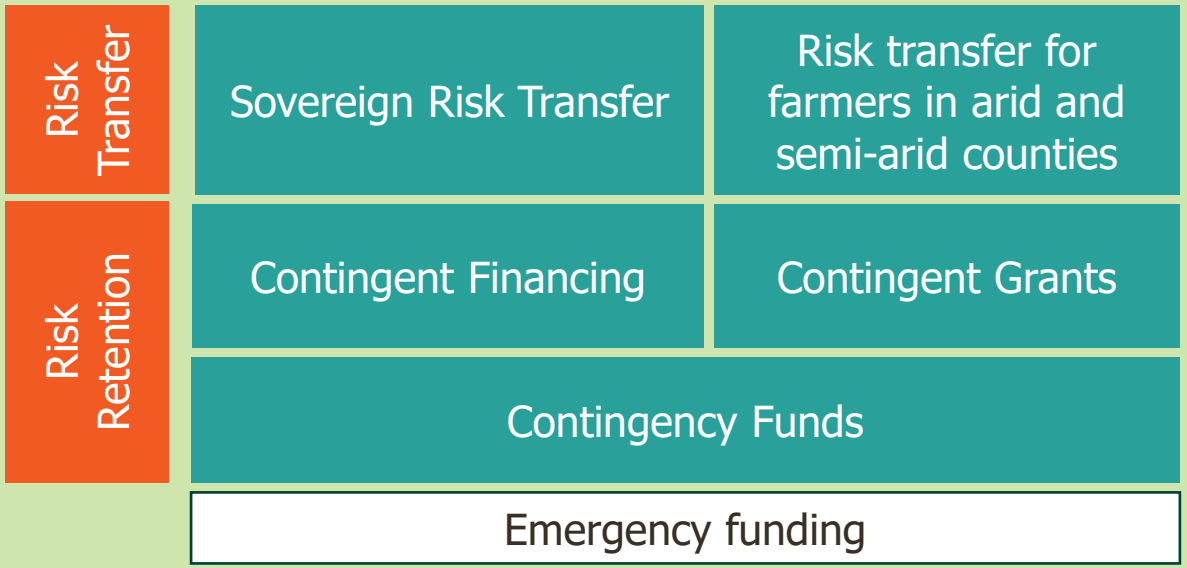
2008-2011 Drought

$12.1bn damages & losses to economy

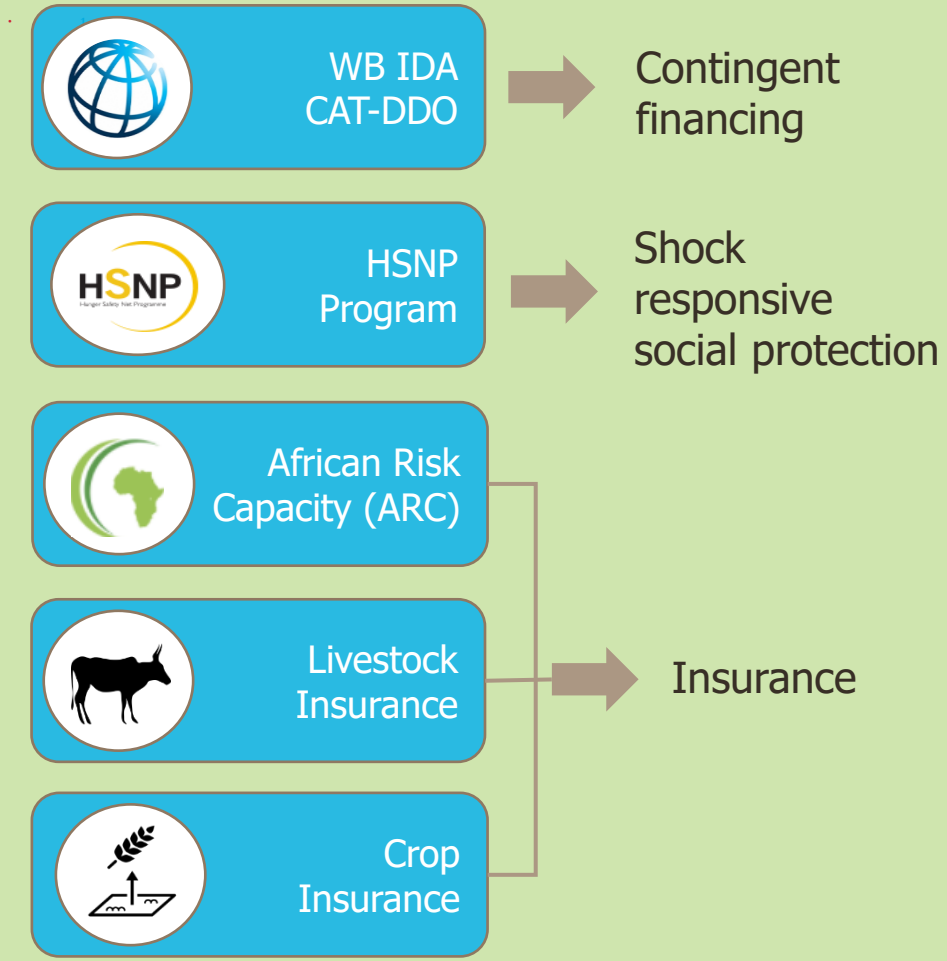
GoK & humanitarian aid received was $860 mm

Excellent yet fragmented programs to strengthening financial resilience

Risk layering framework



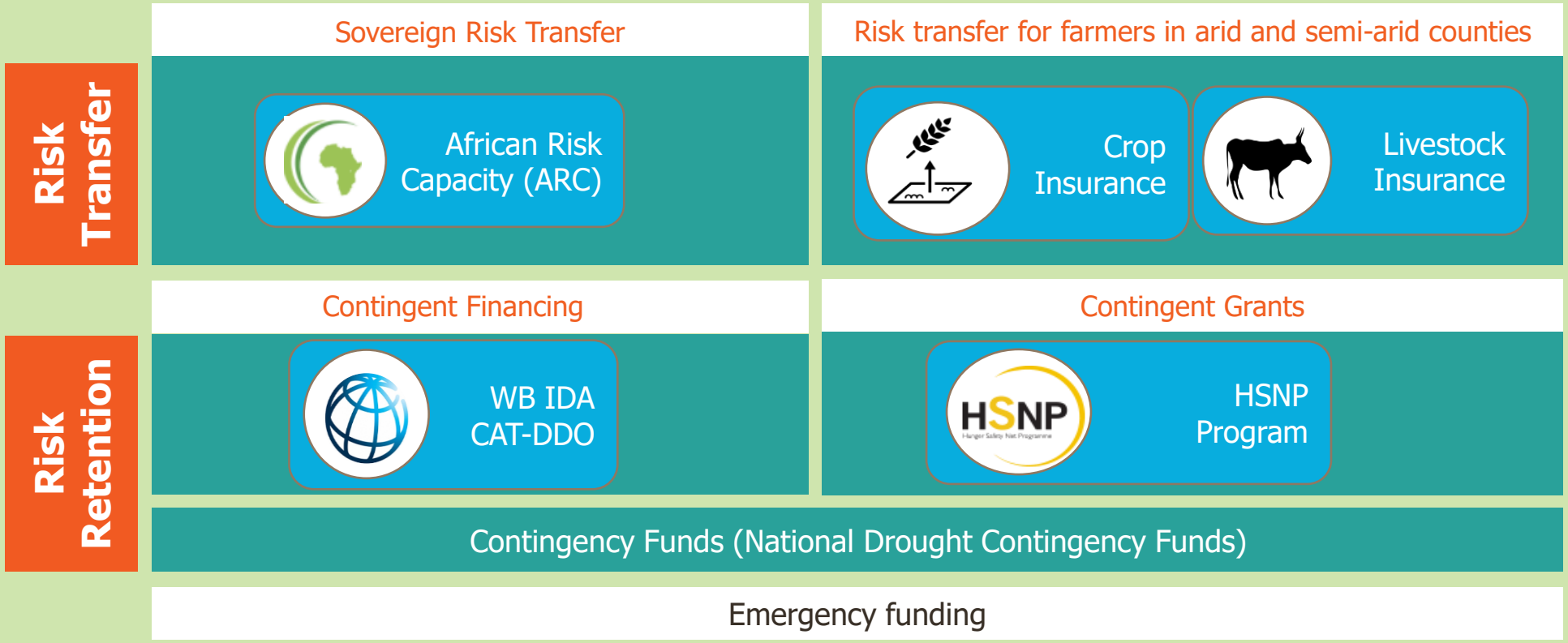
Un co-ordinated programs



National Disaster Risk Finance Strategy drove coordination of risk finance programs

National Disaster Risk Finance Strategy

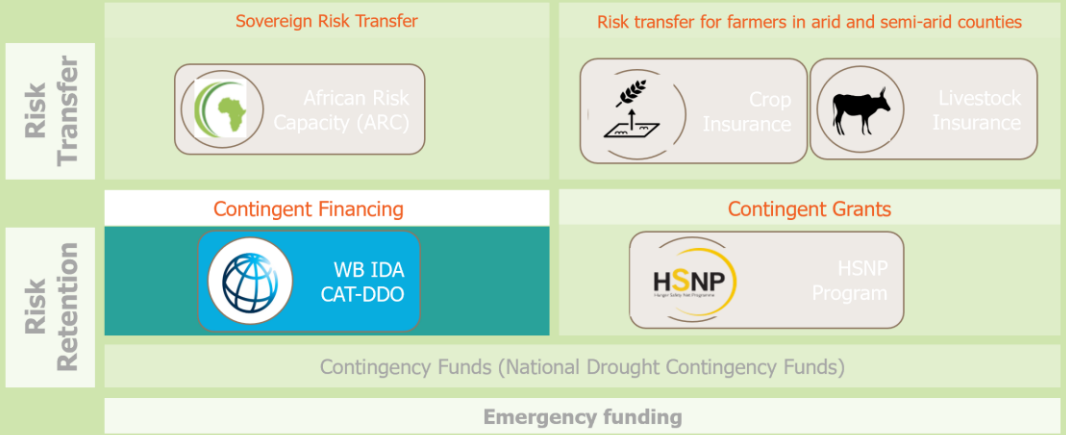
- **Priorities:** ***coordinated*** approach, ***increase financing*** capacity, ***protect*** vulnerable, ***empower*** ministries and counties
- Development goals: (i) to sustain economic growth and to protect economic gains from disaster shocks; and (ii) to reduce the economic impact of disasters on the poorest and most vulnerable people, as identified in Kenya's Vision 2030



Implementing the different programs

The Kenyan & WB CAT-DDO (Risk Retention)

The CAT DDO has the objective of strengthening government of Kenya's financing framework for disaster risk management



What is the CAT DDO?

Kenya had access to a $200m WB CAT DDO which could be used for technical assistance and contingent financing provided to strengthen the disaster risk management framework. Funds used to respond to 2019 floods and Covid-19

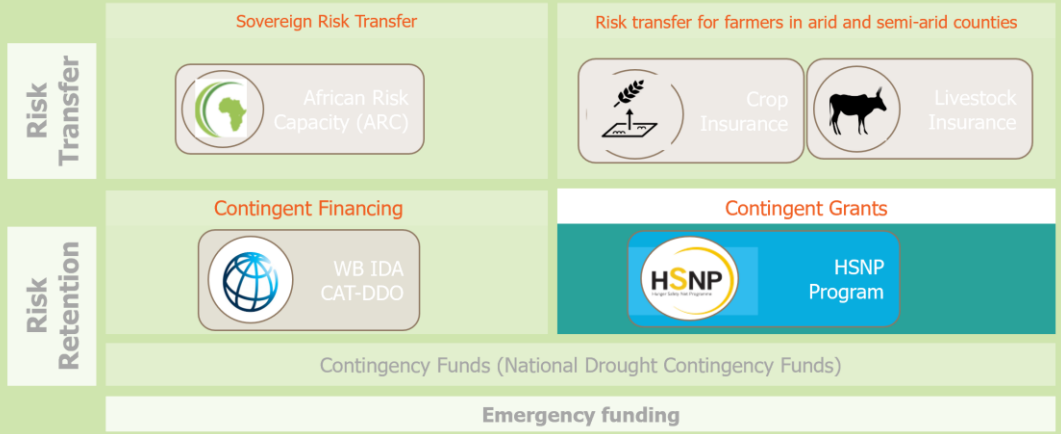
Arranging financial solutions

Implementation

In order to continue to access this funding the Kenya government agreed to prior actions and associated result indicators which are to be measured through the lifetime of the project

Implementing policy decisions

Hunger Safety Net Program (Risk Retention)



What is the hunger safety net program (HSNP)?

HSNP covers 2 programs

1. A social protection fund which provides non conditional cash transfers to 100,000 very poor households (to support the **chronically vulnerable**)

2. Provide scalable cash transfers (using satellite imagery) to an additional 180,000 to **vulnerable** households

Focuses on chronically vulnerable and vulnerable households

Implementation

Sources of funds

The HSNP is funded by the Government of Kenya and the UK Department for International Development (DFID). In addition, the World Bank's Program for Results (P4R) provides funding to the National Safety Net Programme (NSNP).

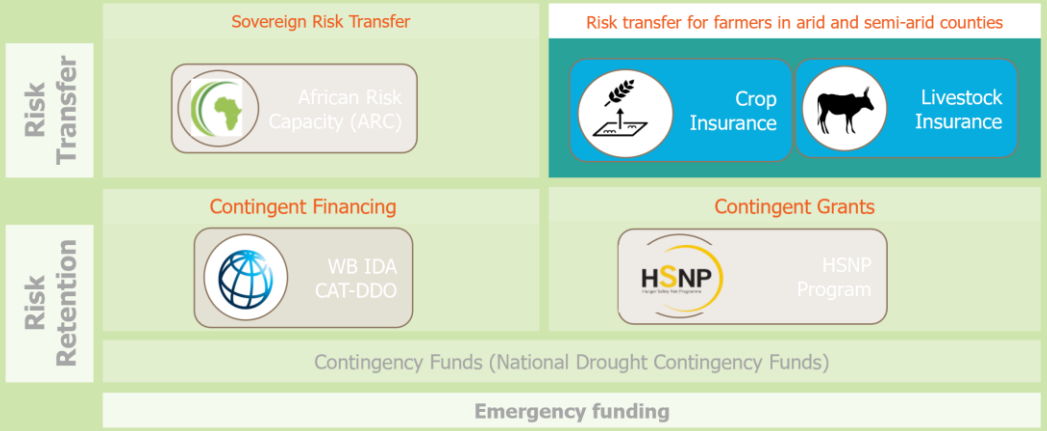
Identifying financial resources

Delivery channels

- The payments are delivered directly to beneficiary bank accounts and can be accessed using standard bank debit cards from local bank branches and a network of pay agents operating across the program's counties.
- Incorporated use of satellite imagery for objectivity

Delivering funds to beneficiaries

Livestock & Agriculture Insurance (Risk Transfer)



What are the livestock and agriculture insurance programs?

The insurance programs are index-based insurance.

- The livestock / drought insurance use a satellite pasture-drought index to trigger timely payouts to pre-identified vulnerable pastoral households.
- The crop insurance estimates yield loss based on crop cutting experiments and makes payouts to farmers

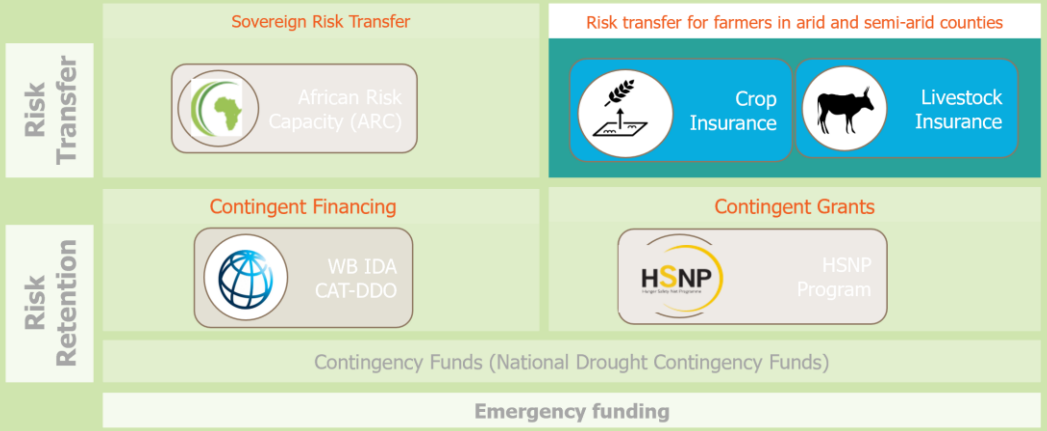
The index approach ensures that the insurance is affordable for farmers and pastoralists, and also enables rapid payouts in cases of shocks

Why was it needed?

The other instruments discussed have focused on risk retention for the GoK. Having insurance would allow GoK to utilise risk transfer specifically for vulnerable pastoralists.

Arranging financial solutions

Livestock & Agriculture Insurance (Risk Transfer)



Implementation

Public Private Partnerships were vital in the implementation of the various agriculture insurance programs.

Identifying partnerships, technical/human & financial resources

Q&A with the Government of Kenya colleagues:

Tom Dienya
Richard Kyuma

1. During implementation, what was your relationship with the National Treasury?
2. What did you feel were the biggest implementation challenges?
3. Did you feel that public sector involvement was important throughout implementation? Please describe why or why not.

Fitting these programs together to support the overall DRF strategy?

Kenya: Implementation of National Disaster Risk Finance Strategy

World Bank CAT DDO ($200M)

ARC drought coverage for 2014/15 and 2015/16 (max coverage $30M), no payouts: DISCONTINUED

- Index Based Livestock Insurance (IBLI)
- Insurance and Risk Management Program (KAIRMP) Kenya Livestock Insurance Program (KLIP)
- Kenya Agriculture Insurance Program (KAIP)

Risk Transfer

Sovereign Risk Transfer

African Risk Capacity (ARC)

Risk transfer for farmers in arid and semi-arid counties

Crop Insurance

Livestock Insurance

Risk Retention

Contingent Financing

WB IDA CAT-DDO

Contingent Grants

HSNP Program

Contingency Funds (National Drought Contingency Funds)

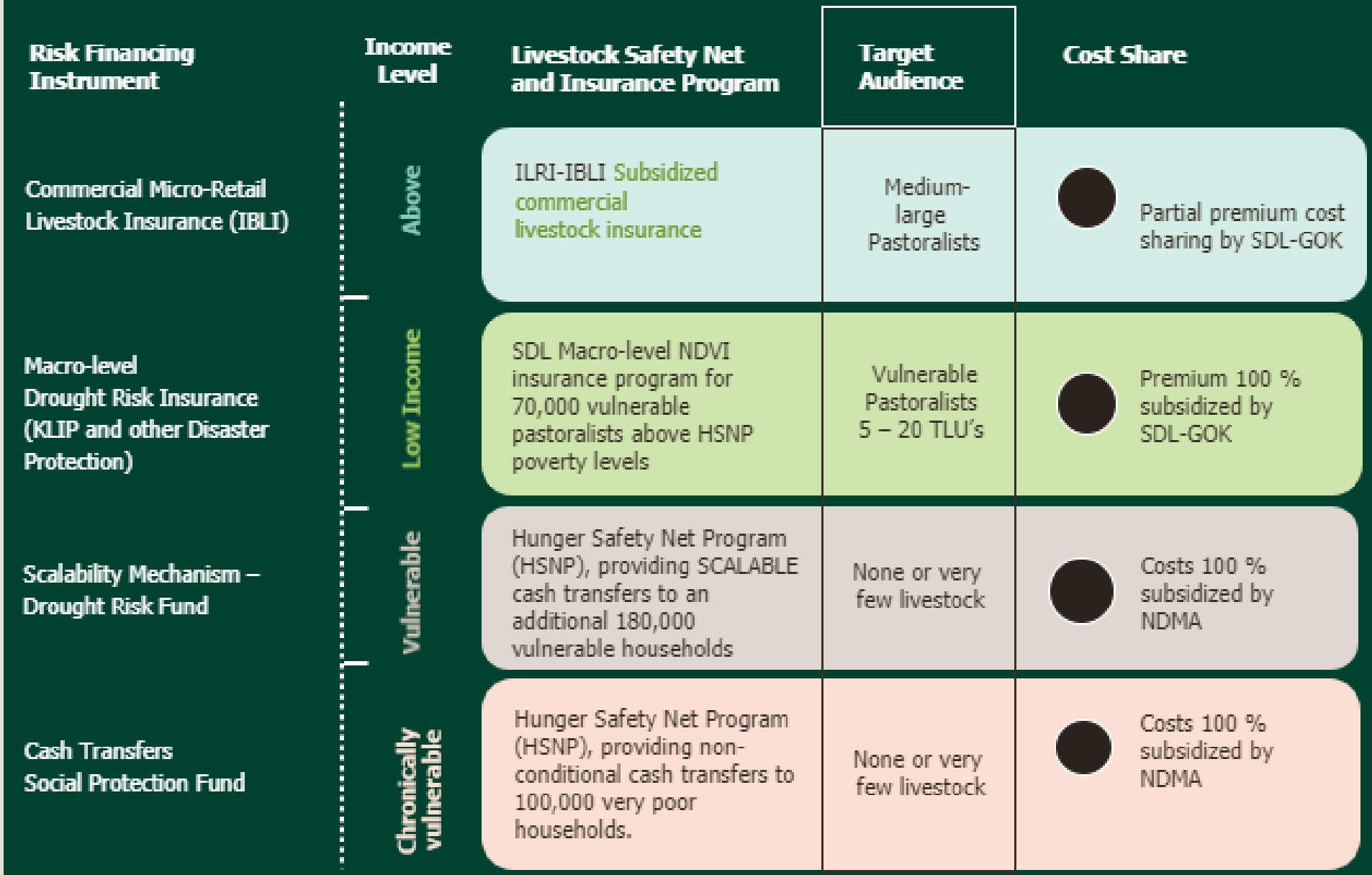
Emergency funding

- Contingencies fund (up to $10M)
- National Drought Emergency Fund ($20M + potential additional contributions)
- EU Drought Contingency Fund ($4.5M exhausted)
- Work on county level contingency funds

Kenya Social and Economic Inclusion Project (US$250M): US$72m for protecting the poorest from drought impacts. **Disbursed US$15M** in 2020

Risk finance mechanism differs by income level

Targeted use of public funds with limited fiscal space



Key Implementation Takeaways

Designing and implementing programs and DRFS can take time, important to have strong governance, stakeholder engagement, procedures set up, and time taken for capacity building of key personnel

Strong government involvement and support at all stages of the operational framework is vital, this ensures buy in and that the program continues to meet the objectives. It is also critical in shaping risk financing programs to meet policy objectives

Private sector leadership of implementation of programs was critical, successful track record of delivery in LIC and MIC contexts

Programs are not a one-time activity, needs regular review and refinement – Importance of M&E in assessing impact and whether program is meeting objectives

Word Cloud: Key Word about this Case Study

Go to www.menti.com

(or prepare the QR scanner on your phone)

QR Code:

Based on the Kenya case study, what is one key word you will take away from this case study of implementing a financial protection strategy?

Use the code: 4644 3377

Monitoring and Evaluation

Michael R. Carter

University of California-Davis, University of Cape Town & NBER

Director, BASIS Markets, Risk & Resilience Innovation Lab

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Monitoring and Evaluation: Topics for Today

- Integrated impact evaluation
- Monitoring other dimensions of contract delivery
- Why index insurance quality matters
- How to define, measure monitor & improve index insurance quality
  - Case 1: Micro insurance
  - Case 2: Sovereign insurance
- How to assure & institutionalize index insurance quality

Integrated Impact Evaluation

- Causal impact evaluation that is integrated with program rollout can provide powerful evidence that can help sustain a program
- Two examples about the impacts that micro index insurance offered to individuals:
  - *Livestock insurance reduced households' reliance on Costly Coping Strategies* in the face of weather shocks
  - *Area yield insurance allowed farmers in Mali to boost their investment in ways that promise a 25% increase in expected household income*
- In both instances, this evidence generated enthusiasm for livestock (KLIP) & cotton insurance (spilled over from Mali to Burkina)
- *Not aware of any similar evidence to date on sovereign index insurance*, which issues government budget support when climate shocks increase government fiscal obligations

Impact of Insurance on Coping Strategies in Kenya (Janzen & Carter 2019)

Meal Reduction (Asset Smoothing)

		Threshold Estimates	
	Average	< 9.3 *TLU*	> 9.3 *TLU*
Insurance Impacts	-12%	-49%**	0.4%
Control Means	71%		

Livestock Sales (Consumption Smoothing)

	Average	< 22.4 *TLU*	> 22.4 *TLU*
Insurance Impacts	-61%***	-54%***	-96%***
Control Means	32%		

Impact of Cotton Insurance in Mali (Elabed & Carter, 2018)

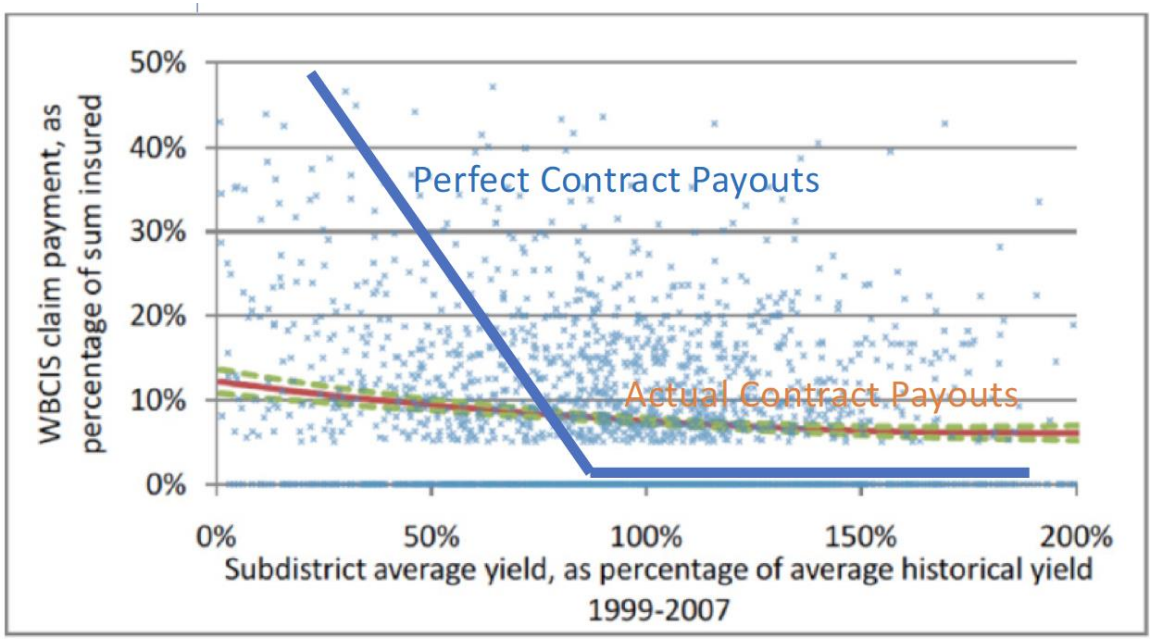
	Cotton Production			Grain Crops
	Area (ha)	Inputs ('000 CFA)	Harvest (kg)	Area (ha)
Impact of Insurance (IV)	1.3**	98**	945	0.6
Mean of Control Group	2.5	223	2567	3.6

Monitoring Index Insurance Design, Distribution & Delivery

- In collaboration with the ILO's Impact Insurance program, the BASIS Innovation Lab devised the 3D Client Value Assessment
- The tool provides an organized way for scoring and evaluating the efficacy of micro index insurance product
- Full details can be found here: https://basis.ucdavis.edu/publication/3-d-client-value-assessment-tool
- The first and most fundamental element in the 3D tool is measurement of the quality protection offered by the insurance index
- Will devote my time to this important topic and its application to both micro and sovereign index insurance tools

Why index insurance quality matters

- The greatest strength of index insurance is that losses do not have to be verified, enabling rapid payment and offering of contracts to populations for whom loss verification is not financially feasible
- But the lack of direct loss measurement is also the greatest weakness of index insurance: the index may fail to trigger payment when losses occur
- The worst thing can befall a household (severe loss) becomes worse if the contract fails to pay (severe loss plus premium paid)
- The same problem can befall a sovereign insurance contract: a contract that does not pay in the face of disaster leaves the government seeking budgetary stability in worse shape than it would have been without the insurance
- Failure prone index insurance can function more as a lottery ticket than insurance, as we see in the data from the right of a first generation index insurance contract in India
- Unfortunately, there are well-publicized examples of these failures at both the micro and sovereign insurance levels



Source: Clarke, Daniel, Olivier Mahul, Kolli Rao, and Niraj Verma. 2012. "Weather Based Crop Insurance in India." Policy Research Working Paper 5985, World Bank.

Quality as a Hidden Trait in Index Insurance

- A quality index insurance contract is one that:
  - Adequately protects farmers against income fluctuations, achieving the before and after the drought effects discussed above (micro insurance); or,
  - Stabilizes government budgets assuring more rapid and effective disaster response (sovereign insurance)
  - Protects reputation of firms and other stakeholders
- Consider an analogy to improved seeds
- Like hybrid maize seeds, quality of index insurance:
  - Is a hidden trait--that is, the farmer cannot look at the contract paper and tell if it will protect her anymore than she can look at a maize seed and directly discern its genetics
  - High quality is more costly to develop and supply than low quality
- Unlike certified hybrid seeds, for index insurance:
  - No defined & enforced quality standards (akin to a 93% seed germination & 5 t/hectare yield standards for seeds)
  - Takes many years for farmers to discern quality (even harder than for maize seeds)
- So what are the equivalent measures to gemination rates & yield standards for index insurance?
- In other words, when is an index contract good enough to buy?

Defining Index Insurance Quality for Micro insurance

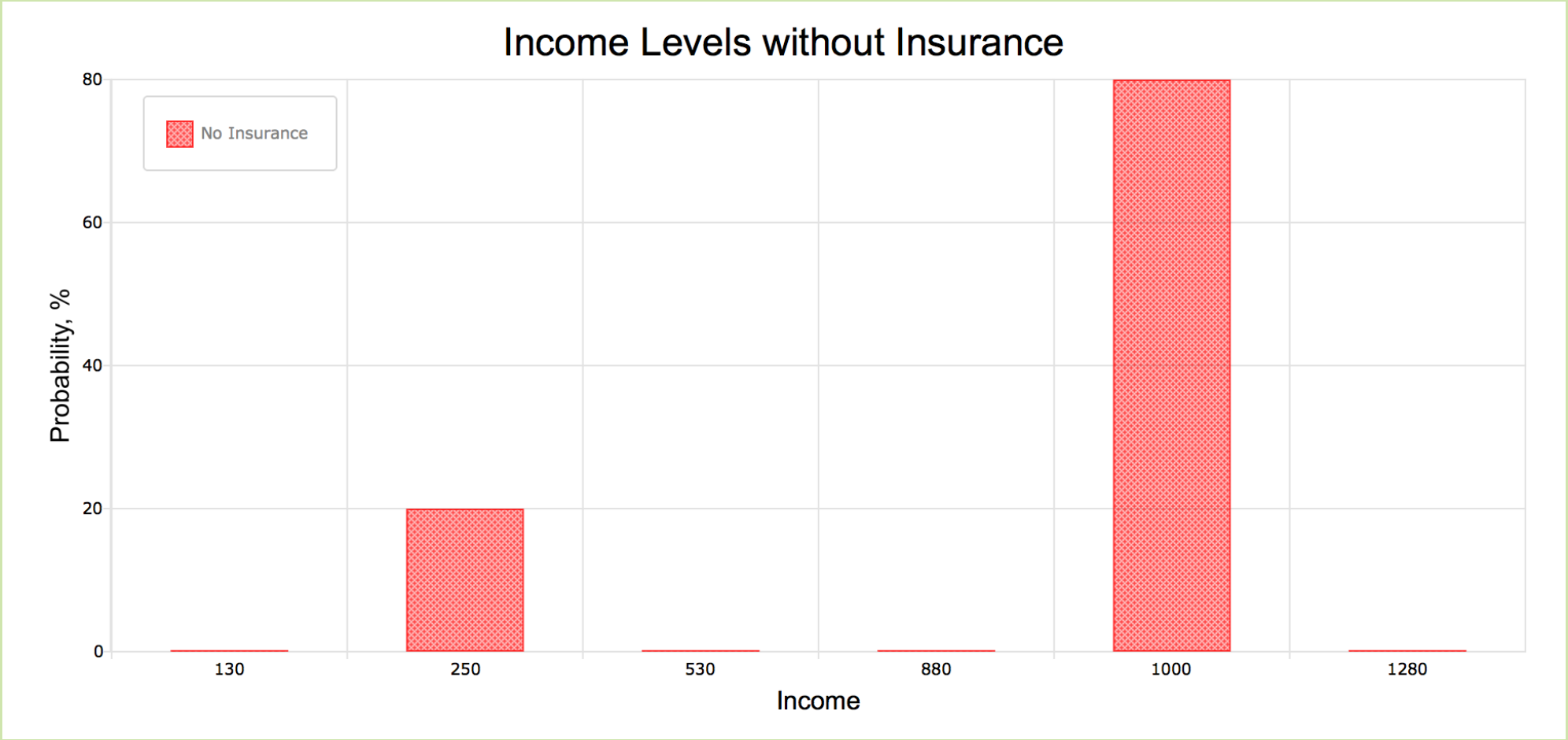
- As a first step, we need clear, conceptually sound minimum quality standard, something akin to maize yields
- Define the Minimum Quality Standard (MQS) as:
  - The *expected economic well-being* of the insured is higher with insurance than it would be without insurance
  - That is, Quality insurance does not hurt people by making them worse off

- So how do we measure expected economic well-being?
- Economics offers several tools for measuring expected economic well-being

- First, use a simple numerical example to explain the quality problem and the minimum quality standard

- Later give a real world examples of measuring and testing to see if a contract meets the MQS

Stylized Agricultural Setting



Stylized Agricultural Setting

- Let's assume that a farm household can experience either a good year or a bad year (see figure):
  - 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
  - Note that the farmer's average or expected income is $850 (= 80% x $1000 + 20% x $250)
- While her average income would be $850, the farmers risks those 1 in 5-year events when she has to get by on only $250
- She knows that she and her family will suffer in those years
- If possible, she would gladly trade off her variable income stream for a guaranteed income that would likely be well less than $850
- The minimum guaranteed income that she would accept in place of her variable farm income is called the "certainty equivalent" of her farm income stream.
- As we shall see, certainty equivalent income is a good measure of the farmer's expected level of economic well- being
- In our simple case, expect the certainty equivalent to be less than $850, but how much less? Let's find out!

Poll 2: Farming Game Choice Experiment

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- Let's put ourselves in this woman's shoes where she faces an 80% chance of earning $1000 and a 20% chance of earning only $250, with average earnings of $850
- Imagine that you are given the choice between taking your chances with an income that fluctuates between $250 and $1000, or receiving a guaranteed or certain amount of money:

Please select an option a) – j)

	a)	b)	c)	d)	e)	f)	g)	h)	i)	j)
Certain Money	1000	850	800	750	700	650	600	550	500	250
Mother Nature's Farming Lottery?										

- For example: a) gives you the choice between getting $1000 for sure or playing the farming game and getting $1000 with 80% chance or $250 with a 20%. (Presumably, we would all take the $1000 for certain)
- But what about the choices b) - j) where we slowly reduce the amount of money you get for certain? When would you switch to risky farming?
- In the Menti poll, please enter the letter for the column at which you would first switch from the certain money to the risky farming game? (Remember, this is your annual family income, and your children depend on you!)

Farming Game Experiment & Risk Aversion

- Menti Poll Results:
  - Choices a)-c) → near risk neutrality (give up almost nothing to get rid of risk)
  - Choices d)-f) → moderate risk aversion (give up between $50 and $250 to get rid of risk)
  - Choices g)-j) → severe risk aversion (give up more than $250 to get rid of risk)
- Using standard analytical tools of economics, your choice identifies your "coefficient of relative risk aversion" and can be used to evaluate how you would decide between other choices that tradeoff average income versus downside risk
- We can also use this same information to determine if any particular insurance contract would make you better or worse off—that is, would the contract increase or decrease your expected level of economic well-being given your degree of risk aversion
- Let's look
  - no-fail, perfect insurance contract
  - imperfect (failure-prone) index insurance contract

Go It Alone or Buy No Fail Insurance?

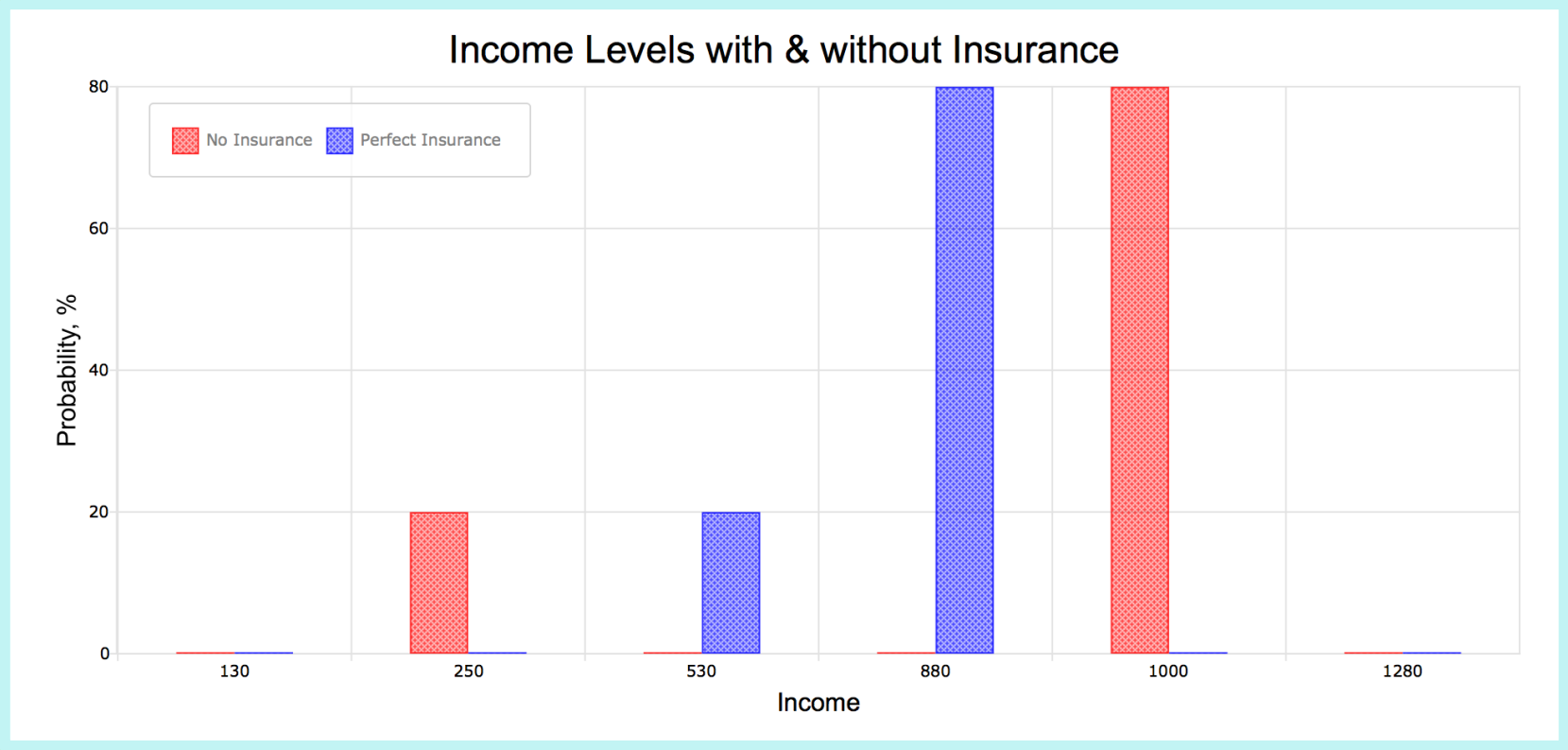
- The farm household can either go it alone and absorb this risk, or it can buy an insurance contract designed to pay the family $400 in bad years – Let's initially assume that this insurance contract that always works, always paying off when the farm experiences a bad year
    - The "pure" or "actuarially fair" premium for this insurance will be the probability a payment is made (20%) times the amount paid ($400): 20% x $400 = $80
    - The market price of the insurance after a 50% markup (reinsurance, taxes, marketing and admin costs) will be 150% x $80 = $120

- 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 Never Fail Insurance?



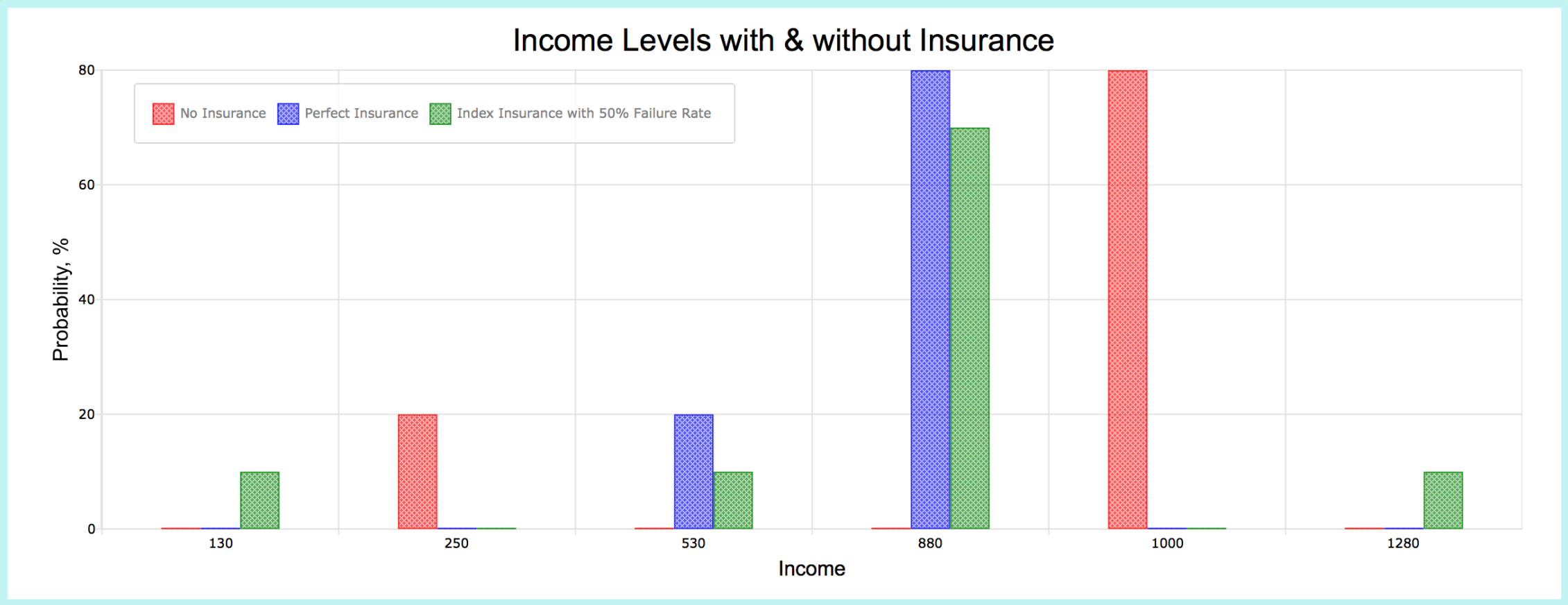
Go It Alone of Buy Never Fail Insurance?

- 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 average income (giving up $40 a year on average)?
- For a moderately risk averse person, the certainty equivalent value of having no insurance is about $725
- Using that same level of risk aversion, the certainty equivalent measure of expected welfare under this never fail insurance is almost $800.
- Clearly $800 > $725, so this insurance contract would cerate a huge gain in terms of individual expected economic well-being.
- The never fail contract easily passes a quality test, in exactly the same way that improved maize seed that outperforms other varieties passes a yield quality standard.
- But what about an index insurance contract?

What about Imperfect Index Insurance?

- Index insurance can be a great tool because it reduces administration costs that make conventional (loss-adjusted) insurance infeasible for small-scale farmers
- But, its Achilles heel is that it sometimes fails farmers, not paying when the farmer truly has a loss that is not due to farmer negligence (*non-compensated losses or false negative*)
- It can also pay farmers when they have not had a loss (*compensated non-losses or false positive*)
- To keep things simpler, we will assume that the false negative probability equals the false positive probability
- We have seen that a risk averse farmer will be better off with perfect insurance rather than going it alone, even when insurance is marked up by 50%
- Let's examine whether a farmer would rather go it alone or have index insurance as we increase the failure rate for index insurance

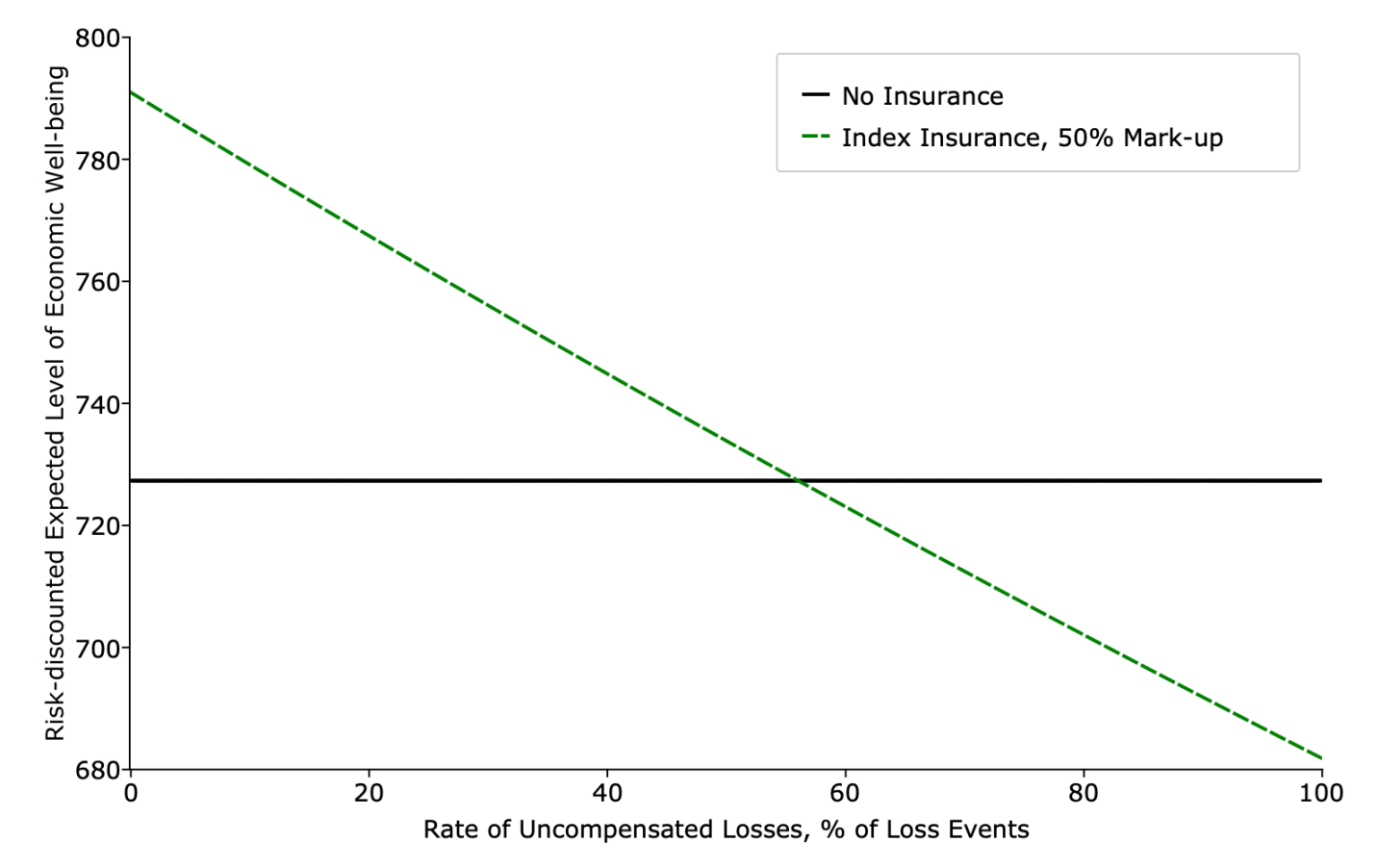
Go it Alone or Buy Failure-prone Index Insurance?



Go it Alone or Buy Failure-prone Index Insurance?

- Note that the worst thing that can happen got worse with index insurance (without insurance, the worst outcome was $250; with failure prone index insurance, the worst thing that can happen is $130!)
- 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
- Average income is still $810 with this insurance, less than the $850 average income with no insurance
- *So Is lower income worth the imperfect stabilization effect of INDEX insurance?*

Index Insurance Passes the MQS if Failure Rate Not "Too High"

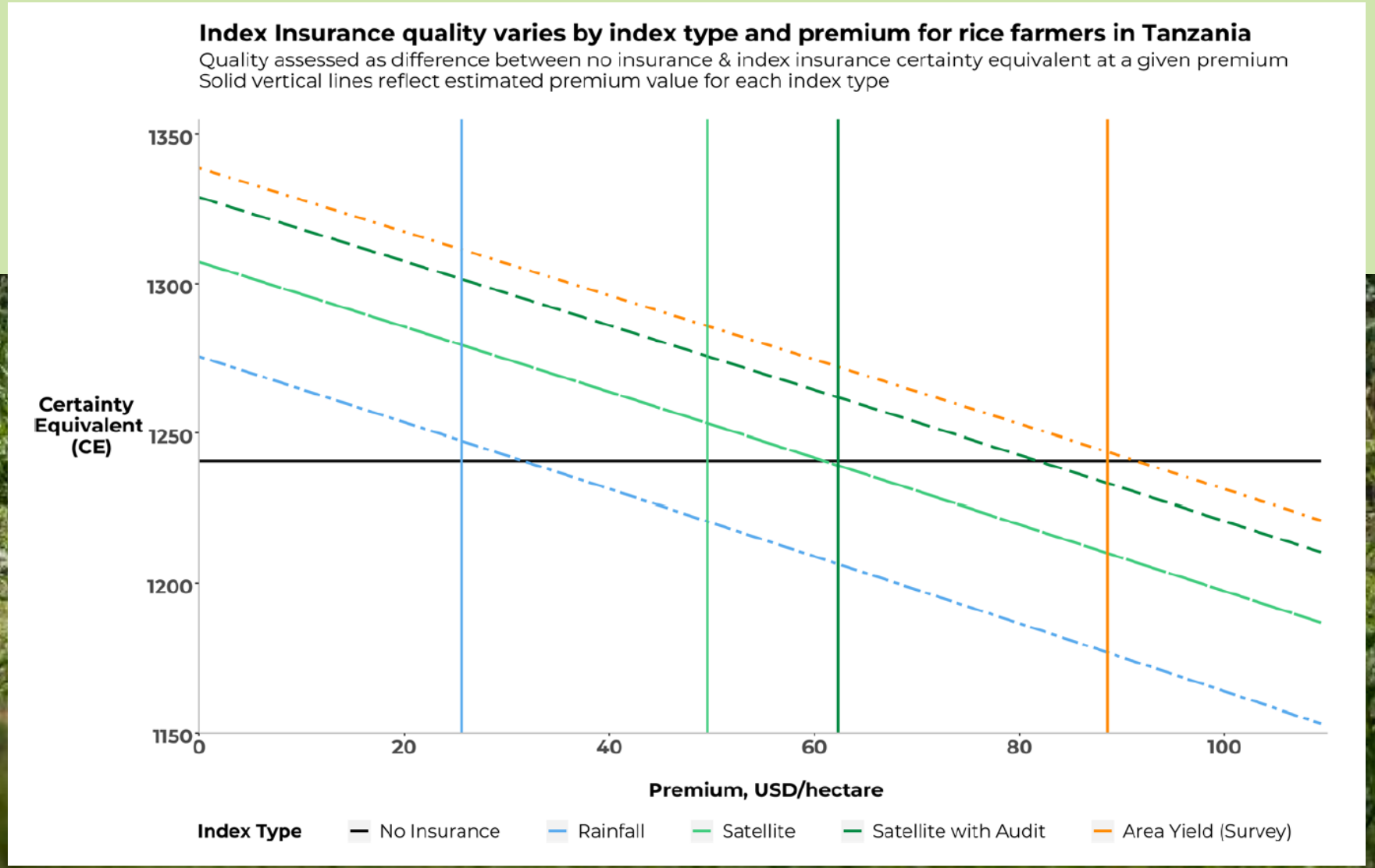


- We can again use our typical level of moderate risk aversion
- The downward sloping line shows expected economic welfare (certainty equivalent income) for index insurance as a function of the failure rate
- In this example, if failure rate approaches 50%,, the farmer is better off going it alone

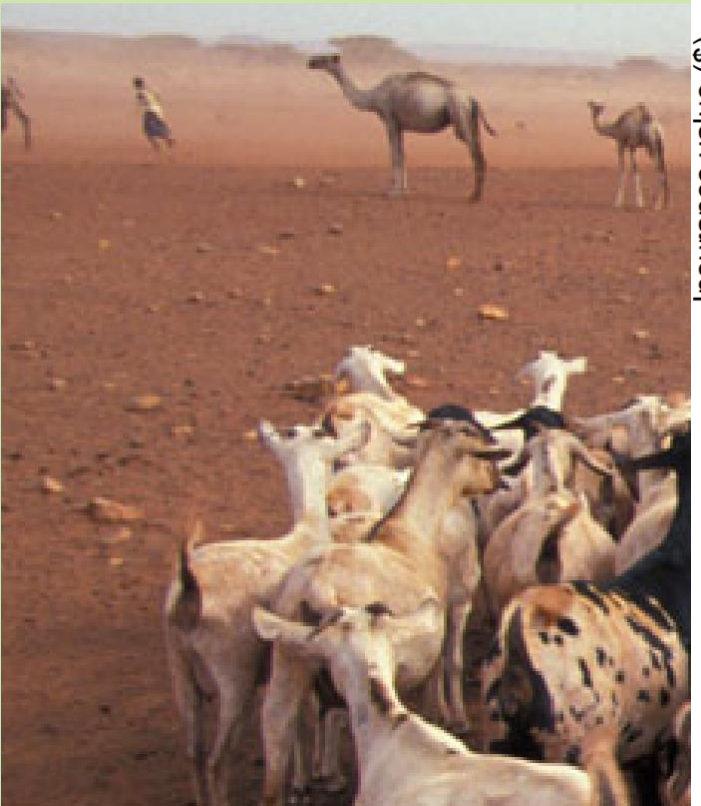
Designing a Real World Contracts that Meet & Exceed the MQS

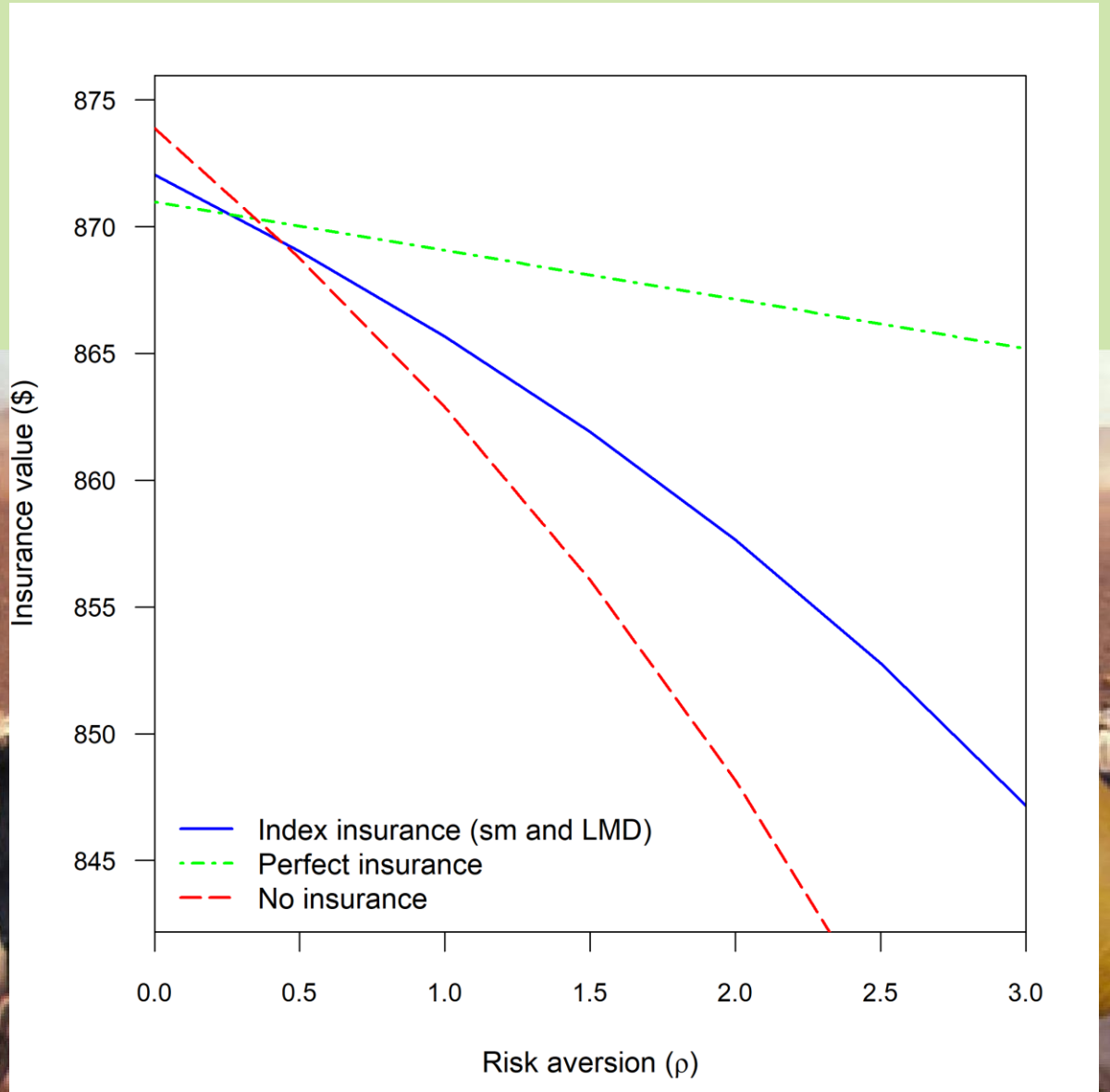
- These exact same tools can be used to evaluate real world contracts and determine if they pass a quality standards test
- All it takes is real world data that allow us to determine farmer's incomes with and without insurance
- Here are two examples:
- Rice farmers in northern Tanzania (data collected through retrospective yield survey)
- Livestock farmers in northern Kenya (data collected contemporaneously over a number of years)

Tanzania Rice Example of Contract Quality



Kenya Livestock Example





Quality Index Insurance Certification (QUIIC)

- Using these expected well-being measures, we thus have a metric that can be used to provide a coherent measure of index insurance quality.
- So how can we solve the problem of getting quality contracts on to the market given that bad contracts may drive out the good? In principal, certification is the solution.
- In collaboration with the NASA-affiliated remote sensing group in Nairobi, the Regional Centre for Mapping of Resources for Development, the Markets, Risk and Resilience Innovation Lab is working with public and private sector partners to develop a voluntary certification mark of index insurance quality
- See numerous examples of voluntary certification standards when the consumer cannot easily discern the quality of a commodity (e.g., fair trade; the ISO series; etc.) where the private
- First certifications underway in collaboration with Government of Uganda
- Still need to test the business case for voluntary certification
- Hope that donors and governments that support or subsidize index insurance will require the standard in order to catalyze the market for individual insurance contacts that can help the vulnerable manage climate change

QUIIC Certified Quality Index Insurance quiic.ucdavis.edu

REGIONAL CENTRE FOR MAPPING OF RESOURCES FOR DEVELOPMENT

Quality as a Hidden Trait for Sovereign Index Insurance

- As just discussed, economic tools can be used to evaluate when a micro-index insurance contract is welfare enhancing for the individual farmer or pastoralist
- And yet, the minister of finance faces a similar problem for discerning the quality of an index insurance contract and judging when it is smart public policy to use limited and costly budget resources to purchase insurance
- This is a more novel problem, but we will next review what we have learned so far about providing concrete guidance on the quality of insurance for governments
- Applicable for other entities that may also be considering insurance solutions to highly variable need for emergency funds

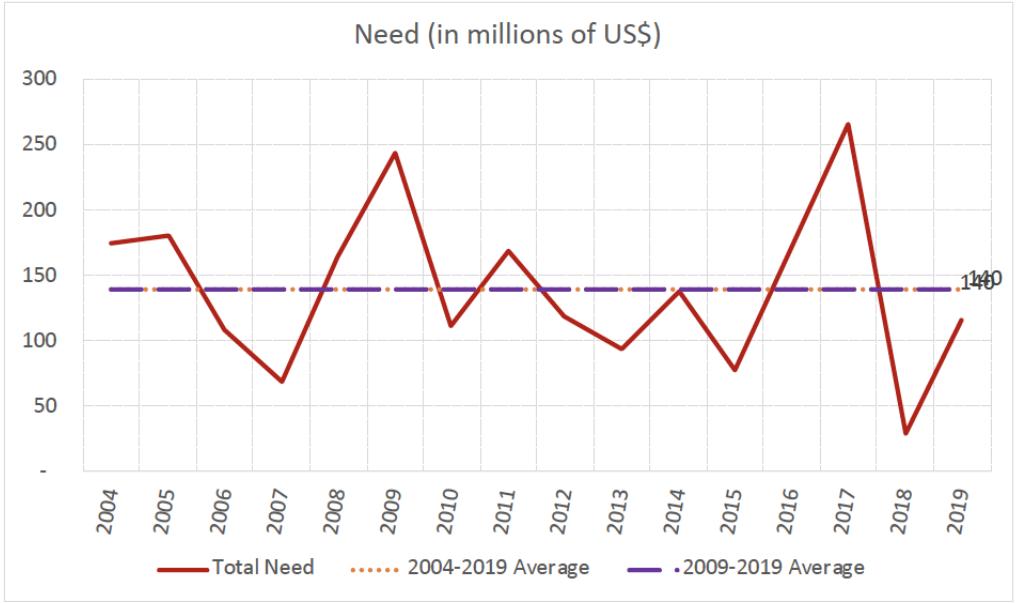
Quality Standards for Sovereign Index Insurance Contracts

- The figure illustrates the highly variable costs of closing the poverty gap for all poor people in Kenya's arid regions
- For governments, these highly variable social protection needs present a budgetary challenge as varied from as little as $40 million to as much as $270m over the 2004-2019 period
- Consider an insurance contract of type j which offers payouts I_t^j when contractually predicted social protection budgetary needs ($\tilde{T}_t^j$) exceed the average budget need of $\bar{T}$ $140m:

$$I_t^j = min[0, \tilde{T}_t^j - \delta\bar{T}]$$

- Note that $\delta \geq 1$ is the policy deductible. Here set $\delta = 1$
- We will consider two types of contracts:
  - A (mythical) perfect insurance contract that predicts need without error
  - A remote-sensing based rangeland forage index contract a la IBLI & KLIP that has some prediction error
  - Both will be priced at the same mark-up over the pure or actuarially fair premium
- We want to answer the normative question: *when should the government purchase insurance protection in preference to a go it alone of Pay-as-You-Go (PYG) policy?*

Figure 2: NDMA (Estimated) Costs of Full Social Protection in Ke

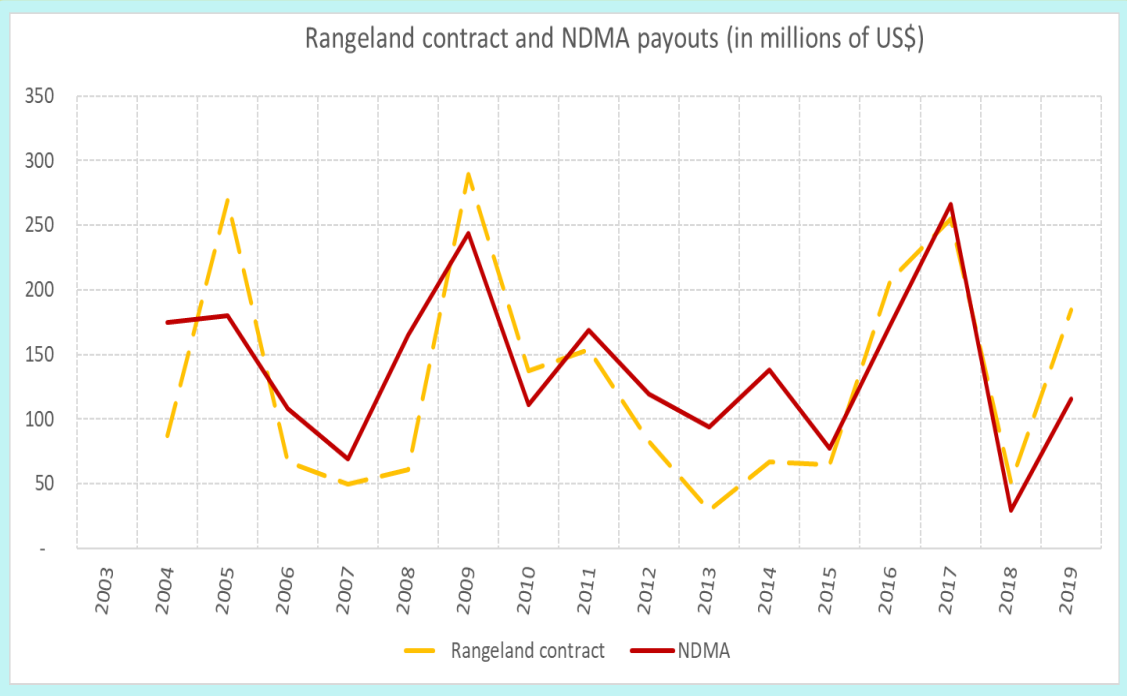


Quality Standards for Sovereign Index Insurance Contracts

- So is the rangeland index insurance contract shown in the figure worth buying given that it imperfectly predicts need?
- We propose two alternative metrics for measuring sovereign insurance quality and the normative question:
  - Calculate the expected full economic costs of always providing full social protection to all needy people. Using this metric**, an insurance contract passes the quality standard if it delivers full social protection benefit at lower economic cost than the PYG policy of not purchasing insurance**
  - *Calculate the expected Social Welfare Benefits of Addressing Poverty Given a Fixed Social Protection Budget*. Using this metric, **an insurance contract passes the quality standard if offers higher social welfare than a no insurance, PYG policy with the same total budget.**

In other words:

- The first approach says choose the fiscal option that minimizes the economic cost of reaching a binding policy obligation
- The second approach choose the fiscal option that maximizes the economic well-being of the target vulnerable population given a binding government social protection budget constraint



Measuring the Economic Cost of Meeting a Binding Social Protection Obligation

- When the government must close the poverty gap, its budget draw in a particular year will be:

$$SP_t = T(p_t) - I_t^j + \pi^j(1+r),$$

  where I_t^j is the indemnity payout, π^j is the actuarially fair price and r is the mark-up rate

- Note that under the PYG policy, $I_t, \pi = 0$ as there is no insurance
- Logic of sovereign insurance is that it is very costly & difficult to raise funds in years of stress and extraordinary social protection need
- Could assume that the government can borrow on the capital market at a penalty interest rate when it needs extra funds to cover social protection costs
- Alternatively, we assume that budget is extracted from another government account specifically a public investment account.
- The macroeconometric literature says that overall economic growth is:
  - Increasing in the level of public investment spending
  - Decreasing in the volatility of public investment spending
- Note that the PYG policy will damage growth through both mechanisms
- Can perfect insurance, and imperfect insurance do better than the PYG policy?

Measuring the Economic Cost of Meeting a Binding Social Protection Obligation

- Using the data from the figures above and the best estimates from the literature on the costs of reduced public investment spending and increased public investment volatility, we find that:
  - The no insurance PYG policy would have cost Kenya a cumulative total of $434m in reduced GDP over the 2009 to 2019 time period
  - A perfect insurance contract (sold at a 10% markup) would have cost only a fraction of that amount: $179m.
  - The index insurance contract would have done equally as well as the perfect contract [a small caveat here]

- Note that we ignore the economic and other benefits of meeting the social protection obligation as those benefits are identical across policies

- We are also assuming that the cost and speed of delivering this social protection is the same between the insurance and PYG policies

Measuring the Social Benefits under a Fixed Social Protection Budget

- Now, let's consider the implication of making the opposite assumption—namely the government cannot expand its budget in years of need and instead wants to do the best it can given a fixed social protection budget
- Should the government buy insurance or follow the PYG policy?
- Under this specification, the money available to the government is:

$$\overline{SP}_t^J = \overline{T} + I_t^J - \pi^J(1+r).$$

  where $\overline{T}$ is the fixed budget allocation to the social protection ministry ($140m in our case study)

- Under this fixed budget the transfer to a poor person may no longer suffice to fully close the poverty gap, implying welfare losses for the vulnerable population:

$$y_p(p_t) = \begin{cases} \underline{y} \ \ if \ \ \dfrac{\overline{SP}_t^J}{p_t} > \underline{y} \\ \dfrac{\overline{SP}^J}{p_t} \ \ otherwise \end{cases}$$

  where y_p is the income of a poor person, $\underline{y}$ is the poverty line and p_t is the number of poor people

- The PYG policy will expose vulnerable to a lot of income fluctuations in years of severe need that cannot be met because of the fixed government budget obligation
- Again, can either perfect or imperfect index insurance beat the PYG policy in terms of providing better economic well-being for the vulnerable for the same price

Measuring the Social Benefits under a Fixed Social Protection Budget

- After transforming the income of poor people into a well-being or utility metric (i.e., assuming that being really poor diminishes well-being a lot), we find the following:

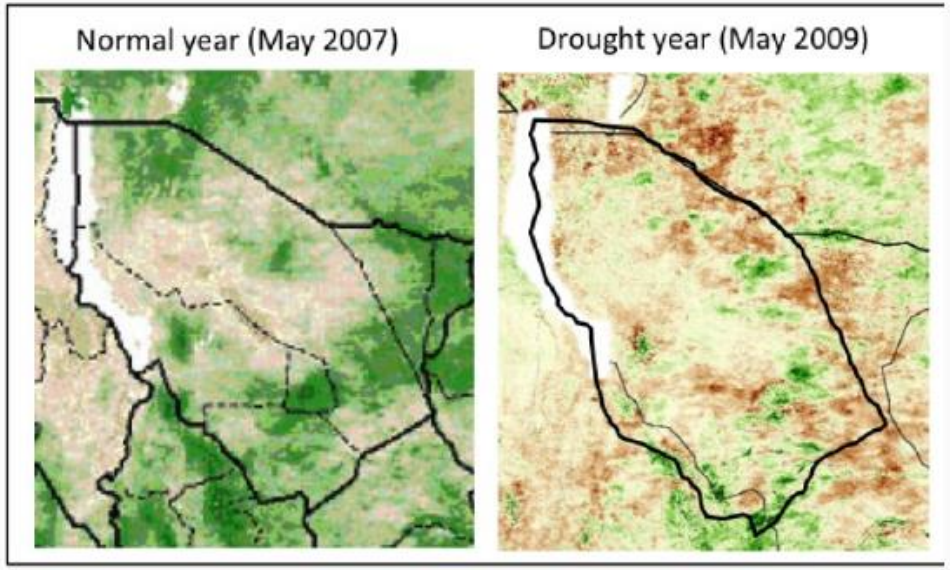
(c) Long Rains, $\rho = 2.5$

Markup	0%			10%			20%		
	SW	IP	Headcount	SW	IP	Headcount	SW	IP	Headcount
No social protection	1.67	1.49	1,804,097	1.67	1.49	1,804,097	1.67	1.49	1,804,097
Pay as you go	1.84	1.82	1,224,588	1.84	1.82	1,224,588	1.84	1.82	1,224,588
Index insurance	1.85	1.81	1,726,860	1.84	1.78	1,726,860	1.82	1.75	1,726,860
Perfect insurance	1.87	1.85	1,629,142	1.86	1.82	1,629,142	1.84	1.80	1,629,142

- SW is the key social welfare metric. To make it (more) interpretable, we have transformed it into the "certainty equivalent" or risk-adjusted income of a vulnerable household over the 2004-2019 time period
- When there is no social protection, the certainty equivalent of a vulnerable person is the equivalent of living on $1.67/day
- The PYG policy (with its budget of $140m) raises that to $1.84, while both perfect and index insurance do better (as long as the mark-up rate is not too high)

In Conclusion

- While there is justifiable excitement about the potential for index insurance to enhance social protection & reduce food insecurity in the fact of climate change, index insurance remains a work in progress
- The greatest strength of index insurance (the fact that losses do not have to be verified for each individual) is also its greatest weakness (the index fails to accurately measure individual losses)
- Using data from Kenya, we have illustrated the use of two coherent measures of policy quality that provide an answer to the question as to whether it makes economic sense for the government to purchase insurance to cover its excess social protection obligations that occur in the face of climate stress
- These tools can also guide the design of contracts: which contract design delivers the lowest public cost or the maximum social benefit
- This latter use of quality metrics is especially important with the rapid advance of remote sensing technologies that promise more accurate prediction of social protection need
- While this is just one example, responsible scaling of index insurance demands better data so that these metrics can be deployed



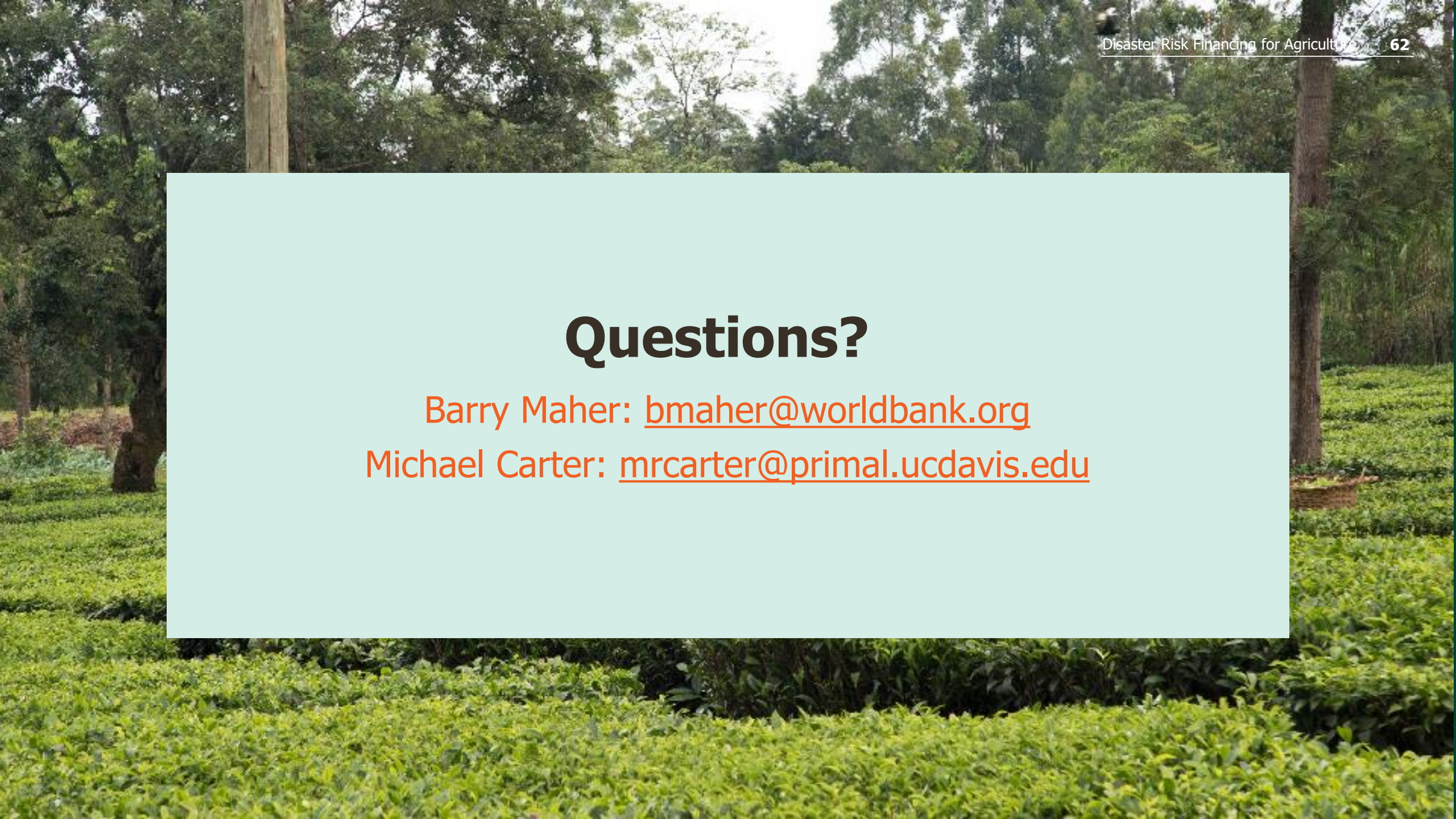
Key takeaways of Module 5

- **Designing and implementing programs and DRFS can take time**, important to have strong governance, stakeholder engagement, procedures set up, and time taken for capacity building of key personnel
- **Strong government involvement and support at all stages of the operational framework is vital**, this ensures buy in and that the program continues to meet the objectives
- **Programs are not a one-time activity, needs regular review and refinement** – Importance of M&E in ensuring impact has been met and learnings are taken on board
- **Designing a way to measure policy quality in a program is important** - Monitoring and evaluation looks to assess whether a program is of economic value for the audience

Next session

SESSION

1. Introduction to DRFA
2. Reducing & Preparing for Risks in Agriculture
3. The Role of Financial Market Solutions for Building Resilience to Shocks in Agriculture
4. Structuring an Agriculture Financial Protection Scheme
5. Implementing an Agriculture Financial Protection Scheme
6. Risk Finance Instruments 1 – Agricultural Insurance
7. Risk Finance Instruments 2 – Risk Retention Mechanisms for Agriculture
8. Risk Finance Instruments 3 – Macro and meso-level Risk Transfer for Agriculture



Questions?

Barry Maher: bmaher@worldbank.org

Michael Carter: mrcarter@primal.ucdavis.edu