ZIMBABWE AGRICULTURAL INDEX INSURANCE PROJECT

FUNDED BY

IFC International Finance Corporation
WORLD BANK GROUP

Creating Markets, Creating Opportunities

Insurance & Pension Commission

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What is Index Insurance?

- Insurance that pays out benefits based on a pre-determined index.
- Index is usually based on parameters that correlate to the insured peril (e.g., rainfall and temperature data can act as proxies for drought and excessive heat).
- Claims settlement processes can be quicker, cheaper, and more objective than indemnity insurance (especially where satellite-based data is used).

Examples of Index Insurance Products

- **Crop weather index insurance:** Based on specific weather parameters, e.g., rainfall, temp, windspeed, soil moisture
- **Area yield index insurance:** Based on average crop production in a given area, e.g., a district or agro-ecological zone.
- **NDVI-based product for livestock:** Uses satellite-based indicator of vegetation greenness to pay out when there is insufficient pasture for livestock.
- **Earthquake insurance:** Payouts based on earthquake magnitude, for instance.

Prerequisites for Index Insurance

1. **Strong correlation between the index and the insured peril.**
2. **Sufficient historical data to design and fairly price the product.**
3. **Availability of real-time/near real-time data for claims settlement.**
4. **Sufficient qualitative or quantitative data on historical damages to assess product accuracy/suitability.**
5. **Supportive regulatory environment.**
6. **Availability of reinsurance capacity.**
7. **Viable distribution channels or partnerships through which products can reach the target market.**

More information on indexinsuranceforum.org

PROJECT OBJECTIVES AND ACTIVITIES

Overall Objective: Improving the enabling environment for agricultural index insurance in Zimbabwe.
Ultimately, supporting improved access to insurance solutions that would strengthen resilience of smallholder farmers to climatic and other risks.

Completion Date: By June 2023

1. MARKET ASSESSMENT

Research and engagement with market stakeholders to assess the current status of index insurance market and its future potential:

Demand

- Key risks to which farmers are exposed
- Agri value chains that could benefit most from insurance
- Potential demand and willingness to pay by farmers and other stakeholders

Supply

- Existing products
- Factors limiting (re)insurers' ability to provide coverage
- Current enabling and data environment

2. REGULATORY FRAMEWORK ROADMAP

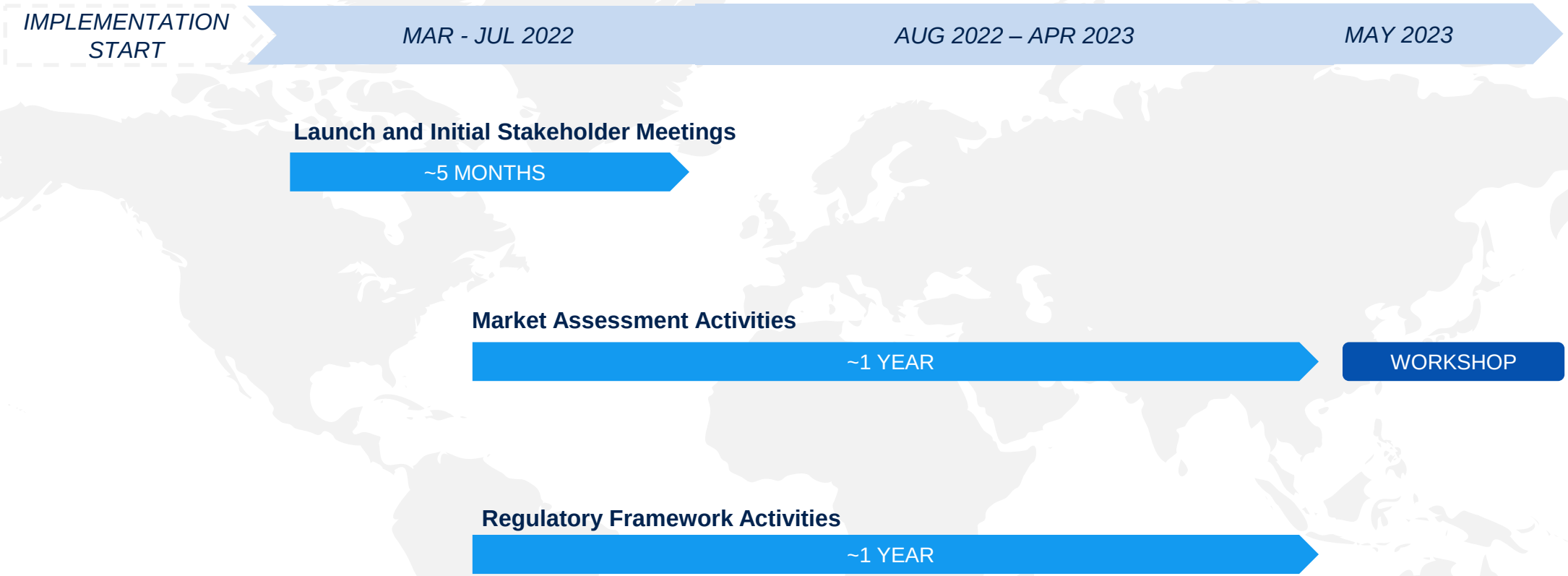
Providing IPEC with the tools and information required to develop an index insurance regulatory framework:

- Best practice in index insurance regulation & supervision
- Knowledge exchange with other insurance supervisors
- Recommended areas of improvement in current enabling environment
- Outline of improvement framework
- Roadmap for framework implementation

Key Outputs:

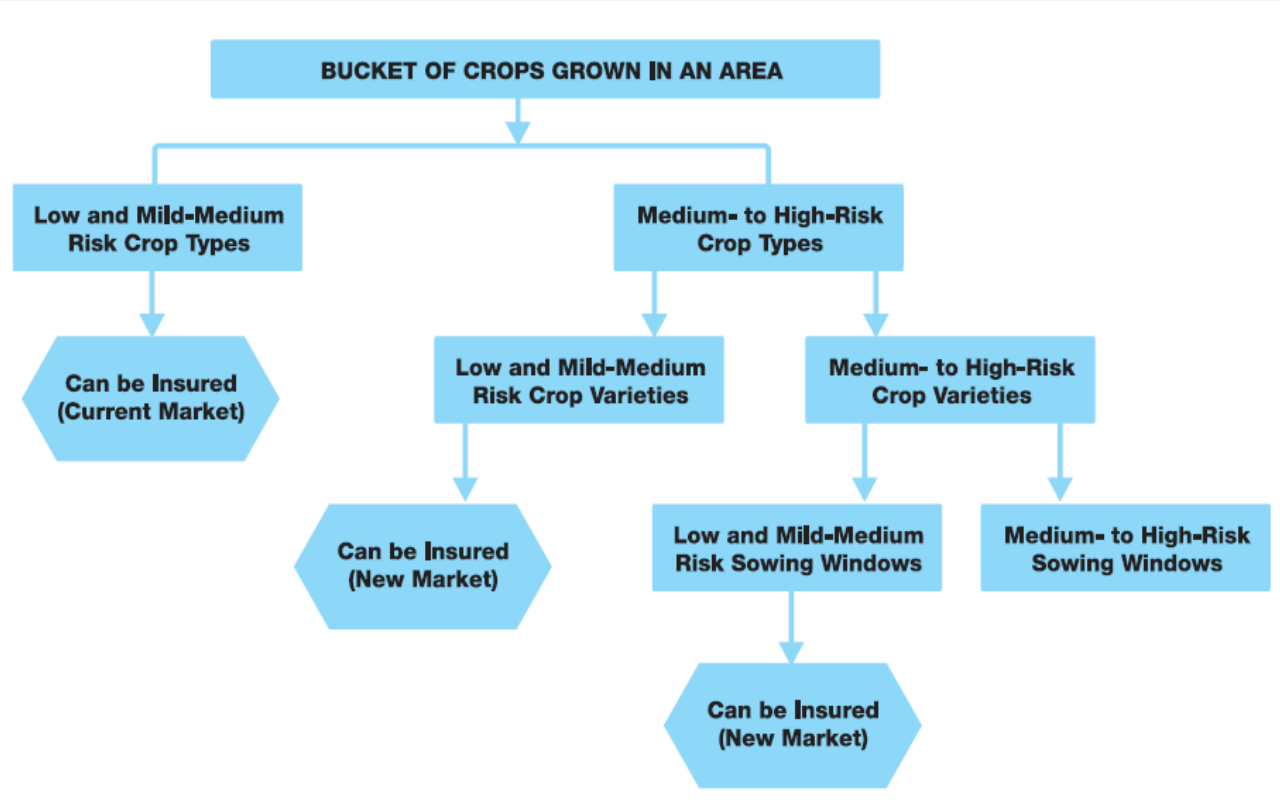
1. **Report on market assessment findings and recommendations**
2. **Dissemination workshop with stakeholders**
3. **Roadmap for implementation of index insurance regulatory framework**

PROJECT TIMELINE



OTHER IFC ACTIVITIES:
Climate Risk Analytics Examples

OVERVIEW OF RISK SCORING HIERARCHY AND RISK MODEL DEVELOPMENT



Risk Scoring Hierarchy

- Results of risk analysis can be applied by financiers and insurers who may want to identify crops, regions and varieties to lend to or insure.
- Other stakeholders e.g., farmers and other agribusinesses may also apply risk information in their decision making.
- May facilitate the flow of more finance into agriculture and encourage the uptake of adaptive practices combined with risk management tools such as insurance.

Risk Model Development

Identifying Optimal Crop Types

Identifying Optimal Crop Type for a Given Geographical Region (1/3)

- There are many times when farmers suffer crop failure because they are growing a crop type and variety that is not suitable for the local climatic conditions.
- Because of high chance of crop failure, premium rates are also usually commensurately high.
- By looking at payout ratios and premium rates generated from a pricing exercise, a ranking system can be used to advise farmers about crops they should focus on.
- Below is an example of a ranking exercise that could inform farmer and financier decisions.

Step 1: Summarize the results of the risk modeling process.

Average payout rate based on the most recent years*							
Crop type	All-year average (percent)	25-year average (percent)	20-year average (percent)	15-year average (percent)	10-year average (percent)	5-year average (percent)	Median of averages (percent)
Maize	21.6	20.4	18.3	18.3	17.5	9.3	18.3
Sorghum	9.0	9.1	8.1	5.9	5.4	4.0	7.0
Beans	8.9	9.7	8.6	6.9	4.0	4.7	7.8
Cowpea	10.1	11.1	9.9	9.7	4.6	5.8	9.8
Green gram	8.3	9.6	8.5	6.7	4.0	4.7	7.5

** Can also use average payout plus loadings to reflect cost of total risk.*

Identifying Optimal Crop Type for a Given Geographical Region (2/3)

Step 2: (a) For each average block (5-year, 10-year, 15-year, and so on) rank crop type by average payout rate from 1 (lowest rate) to 5 (highest rate). (b) For each crop, add the rank values along each row and find total score

Crop type	All-year averagee	25-year average	20-year average	15-year average	10-year average	5-year average	Median of averages	Total score
Maize	5	5	5	5	5	5	5	35
Sorghum	3	1	1	1	4	1	1	12
Beans	2	3	3	3	1	2	3	17
Cowpea	4	4	4	4	3	4	4	27
Green gram	1	2	2	2	1	2	2	12

Identifying Optimal Crop Type for a Given Geographical Region (3/3)

Step 3: Indicate generally accepted premium rate and commercial premium rates for each of the crop types.

Crop type	Commercial premium rate (percent)	Generally accepted premium rate (percent)
Maize	23.9	10
Sorghum	9.3	
Beans	10.2	
Cowpea	12.7	
Green gram	9.9	

Step 4: Indicate which crops policyholders will accept on the basis of their ranking and premium affordability.

Crop type ranking	Crop type	Affordable premium level?
Lowest risk	Sorghum	Yes
Mild-medium risk	Green gram	Yes
Medium risk	Beans	No
High risk	Cowpea	No
Very high risk	Maize	No

Question: Which crops should be promoted? What about the risky crops, should they just be ignored?

Identifying Optimal Crop Varieties

Identifying Optimal Varieties of a Given Crop & for a Given Geographical Area (1/4)

- What if the problem is with the crop variety that farmers are using in that area?
- Could a change in variety have led to better yields and low historical payout ratios?
- In the current scenario, we see that the commercial premium for maize is 23 percent, yet farmers may still want to grow this crop, especially when it is their staple crop.
- The actuarial team could investigate whether there are maize varieties that could be better for the area than the popular variety grown now (180-day variety).
- Farmers could then be advised to change crop variety instead of crop type and still be able to get access to finance and affordable insurance coverage and be assured of a good harvest in most years.
- The scoring exercise below looks at available maize varieties to see whether there are less risky varieties that can be insured at affordable rates.

Identifying Optimal Varieties of a Given Crop & for a Given Geographical Area (2/4)

Step 1: Summarize the results of the risk modeling process.

	Average payout rate based on the most recent years*						
Maize variety	All-year average (percent)	25-year average (percent)	20-year average (percent)	15-year average (percent)	10-year average (percent)	5-year average (percent)	Median of averages (percent)
Variety 1 (200 days to maturity)	28.7	27.2	25.5	27.0	27.6	23.6	27.1
Variety 2 (180 days to maturity)	21.6	20.4	18.3	18.3	17.5	9.3	18.3
Variety 3 (160 days to maturity)	13.2	12.4	10.6	10.8	11.5	4.0	11.2
Variety 4 (140 days to maturity)	9.9	9.7	8.5	8.0	7.6	4.0	8.3
Variety 5 (120 days to maturity)	8.8	8.5	7.3	5.2	3.7	4.0	6.2

** Can also use average payout plus loadings to reflect cost of total risk.*

Identifying Optimal Varieties of a Given Crop & for a Given Geographical Area (3/4)

Step 2: (a) For each block (5-year, 10-year, 15-year, and so on) rank crop type by average payout rate from 1 (lowest rate) to 5 (highest rate).
(b) For each crop, add the rank values along each row and find total score.

Maize variety	All-year average	25-year average	20-year average	15-year average	10-year average	5-year average	Median of averages	Total score
Variety 1 (200 days to maturity)	5	5	5	5	5	5	5	35
Variety 2 (180 days to maturity)	4	4	4	4	4	4	4	28
Variety 3 (160 days to maturity)	3	3	3	3	3	1	3	19
Variety 4 (140 days to maturity)	2	2	2	2	2	1	2	13
Variety 5 (120 days to maturity)	1	1	1	1	1	1	1	7

Identifying Optimal Varieties of a Given Crop & for a Given Geographical Area (4/4)

Step 3: Indicate generally accepted premium level and determine commercial premium rates for each of the crop types.

Maize variety	Commercial premium rate (percent)	Generally accepted premium rate (percent)
Variety 1 (200 days to maturity)	34.9	10
Variety 2 (180 days to maturity)	23.9	
Variety 3 (160 days to maturity)	14.6	
Variety 4 (140 days to maturity)	10.8	
Variety 5 (120 days to maturity)	8.3	

Step 4: Indicate which crops policyholders will accept on the basis of their ranking and premium affordability.

Maize variety ranking	Maize variety	Affordable premium level?
Lowest risk	120 days to maturity	Yes
Mild-medium	140 days to maturity	No
Medium risk	160 days to maturity	No
High risk	180 days to maturity	No
Very high risk	200 days to maturity	No

Identifying Optimal Sowing Period

Identifying Optimal Sowing Windows for a Given Crop & Geographical Area (1/3)

- For the whole sowing period (March 1–21) Variety 5 is best suited for this area; therefore, maize farmers could be insured at less than 10 percent if this variety is adopted.
- However, there will still be some farmers that may prefer Variety 4 (140 days to maturity).
- Let's explore whether there is a sowing period that would lead to reduced risk for this given variety.
- The analysis below seeks to identify an optimal sowing window for the 140-day maize variety in this given area.

Step 1: Summarize the results of the risk modeling process.

	Average payout rate based on the most recent years*						
Sowing window maize variety: 140 days to maturity	All-year average	25-year average	20-year average	15-year average	10-year average	5-year average	Median of averages
March 1 planting	9.9	9.7	8.5	8.0	7.6	4.0	8.3
March 6 planting	8.8	8.8	7.4	6.5	8.0	4.0	7.7
March 11 planting	7.2	5.9	4.7	3.1	2.6	0.0	3.9
March 16 planting	7.6	6.5	6.0	5.8	4.7	3.5	5.9
March 21 planting	10.1	9.4	9.2	9.2	7.2	4.3	9.2

** Can also use average payout plus loadings to reflect cost of total risk.*

Identifying Optimal Sowing Windows for a Given Crop & Geographical Area (2/3)

Step 2: **((a) For each block (5-year, 10-year, 15-year, and so on) rank crop type by average payout rate from 1 (lowest rate) to 5 (highest rate).**
(b) For each crop, add the rank values along each row and find total score

Sowing window maize variety: 140 days to maturity	All-year average	25-year average	20-year average	15-year average	10-year average	5-year average	Median of averages	Total score
March 1 planting	4	5	4	4	4	3	4	28
March 6 planting	3	3	3	3	5	3	3	23
March 11 planting	1	1	1	1	1	1	1	7
March 16 planting	2	2	2	2	2	2	2	14
March 21 planting	5	4	5	5	3	5	5	32

Step 3: **Indicate generally accepted premium level and determine commercial premium rates for each of the crop types.**

Sowing window maize variety: 140 days to maturity	Commercial premium rate (percent)	Generally accepted premium rate (percent)
March 1 planting	10.8	10
March 6 planting	10.0	
March 11 planting	5.4	
March 16 planting	7.8	
March 21 planting	11.9	

Identifying Optimal Sowing Windows for a Given Crop & Geographical Area (3/3)

Step 4: Indicate which crops policyholders will accept on the basis of their ranking and premium affordability.

Sowing window ranking	Sowing window	Affordable premium level?
Lowest risk	March 11–15	Yes
Mild-medium	March 16–20	Yes
Medium risk	March 6–10	Yes
High risk	March 1–5	No
Very high risk	March 21–26	No

Value of Insurance to a Financier

Example: Financier Parameters

TARGET MAXIMUM DEFAULT RATE

TARGET MAXIMUM DEFAULT RATE	4%

FINANCING COST PARAMETERS

COST OF CAPITAL (%)	5%
EXPENSE (%)	20%

PREDICTION INTERVAL (%)

LOWER	5%
UPPER	95%

LOAN DISBURSEMENT DISTRIBUTION (%)

AREA A	AREA B	AREA C	AREA D	AREA E	AREA F	AREA G	AREA H	AREA I	AREA J
10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

Example: Financier Default and Insurance Payout Data

GROSS DEFAULT RATES (%)

YEAR	AREA A	AREA B	AREA C	AREA D	AREA E	AREA F	AREA G	AREA H	AREA I	AREA J
2004	2%	3%	1%	3%	2%	15%	3%	3%	4%	1%
2005	2%	2%	1%	1%	8%	2%	3%	2%	4%	1%
2006	2%	3%	2%	1%	2%	3%	3%	2%	4%	1%
2007	5%	4%	1%	2%	2%	2%	25%	3%	27%	34%
2008	0%	2%	1%	16%	2%	20%	3%	34%	4%	27%
2009	9%	3%	4%	2%	2%	4%	4%	5%	4%	5%
2010	1%	15%	1%	2%	1%	3%	3%	2%	10%	3%
2011	1%	3%	1%	4%	3%	2%	5%	1%	4%	5%
2012	1%	3%	1%	2%	10%	1%	3%	2%	3%	4%
2013	1%	3%	2%	5%	2%	3%	3%	2%	3%	4%

HISTORICAL PAYOUT RATIOS (%)

YEAR	AREA A	AREA B	AREA C	AREA D	AREA E	AREA F	AREA G	AREA H	AREA I	AREA J
2004	0.0%	0.0%	0.0%	0.0%	0.0%	15.0%	0.0%	0.0%	0.0%	0.0%
2005	0.0%	0.0%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2006	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2007	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.0%	0.0%	22.0%	23.0%
2008	0.0%	0.0%	0.0%	13.0%	0.0%	19.0%	0.0%	31.0%	0.0%	24.0%
2009	5.0%	0.0%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2010	0.0%	11.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.0%	0.0%
2011	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2012	0.0%	0.0%	0.0%	0.0%	7.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2013	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Summary: Financier Portfolio Information and Risk Transfer Appetite

9.5.2 Resource B: Risk modeling results—Product pricing	
GROSS DEFAULT RATE (NO INSURANCE)	
PROBABILITY OF GROSS DEFAULT RATE GREATER THAN TARGET	59%
EXPECTED GROSS DEFAULT RATE	4.42%
PROJECTED GROSS DEFAULT RATE FOR 1 IN 20 YEAR EVENT	7.81%
PROJECTED COST OF GROSS DEFAULT RISK	5.73%
NET DEFAULT RATE (WITH INSURANCE)	
PROBABILITY OF NET DEFAULT RATE GREATER THAN TARGET	0%
EXPECTED NET DEFAULT RATE	2.41%
PROJECTED NET DEFAULT RATE FOR 1 IN 20 YEAR EVENT	3.44%
PROJECTED COST OF NET DEFAULT RISK	3.08%
VALUE OF INDEX INSURANCE	
VALUE OF INDEX INSURANCE	2.65%

Value of Insurance (VoI)* =
Cost of Default Risk w/out insurance – Cost of Default Risk With Insurance

- Positive VoI implies value addition
- VoI is the max. amount this FI should reasonably pay for insurance
- This tool enables FI to assess value addition of a proposed insurance (or other risk mitigation) solution.

*Projected cost of gross and net default risk incorporates FI's expenses and cost of capital.

DISCUSSION AND Q&A

Feedback on the proposed project.

- Is the project relevant?
- Any key factors to consider when implementing the project, any key stakeholders or programs that the project should connect with?

Feedback on the climate risk analytics advisory. Any suggestions on best approach for introducing this in Zimbabwe?

- IFC could transfer required skills to insurance companies so they can use these to reach more financial institution clients and offer pricing that promotes good decision making in selecting crops and varieties
- IFC could offer this service directly to financial institutions to support their lending and portfolio management
- Select locally based Insurtech firms that would offer this as a service to insurers and banks, with IFC supporting the Insurtech firms with capacity development

Any other comments/questions?