Index Insurance for Drought Tolerant Maize: Results from Pilot in Central Mozambique

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Index-Based Agricultural Insurance in Mozambique: Recent Experience and Paving the Way Forward

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Maputo

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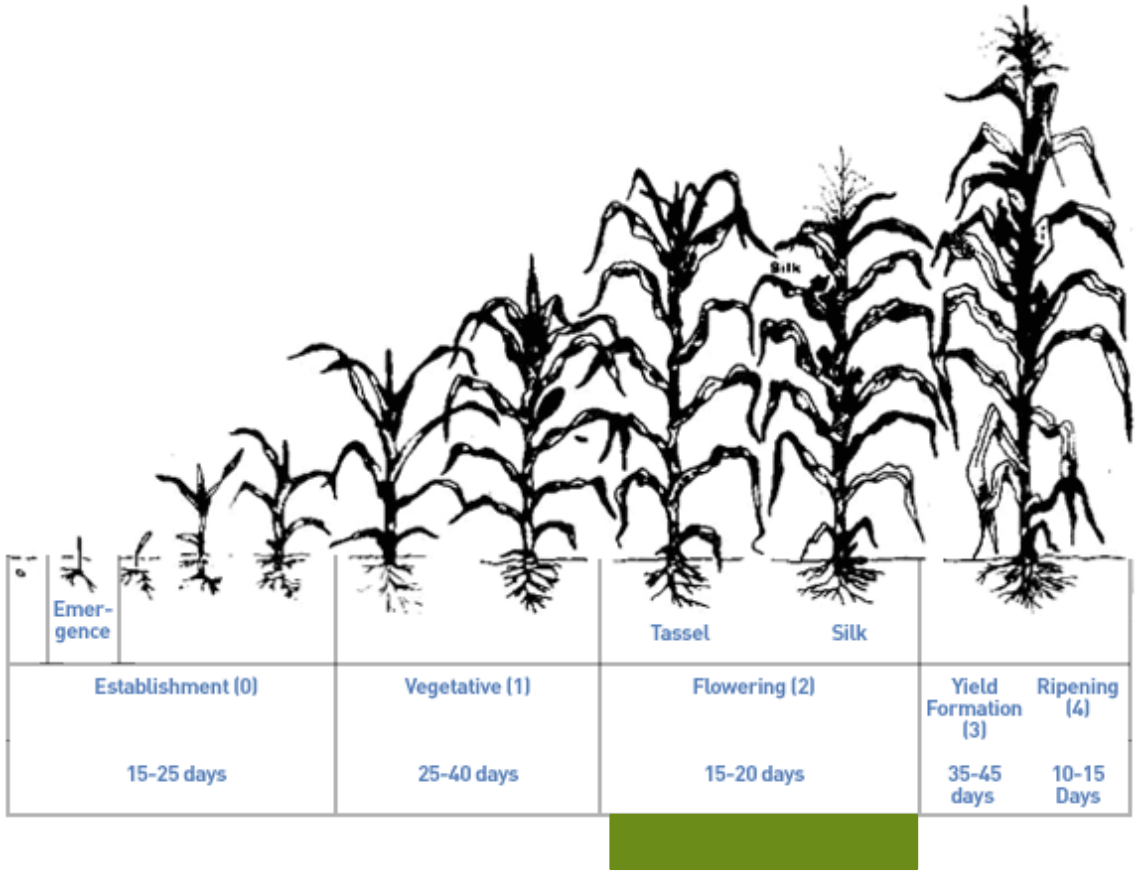
Participants

- Research Team
  - University of California, Davis
  - CIMMYT
- Implementing Partners
  - Hollard Insurance
  - Klein Karoo Seed Company
  - Phoenix Seed Company
- Funding
  - USAID

Objectives

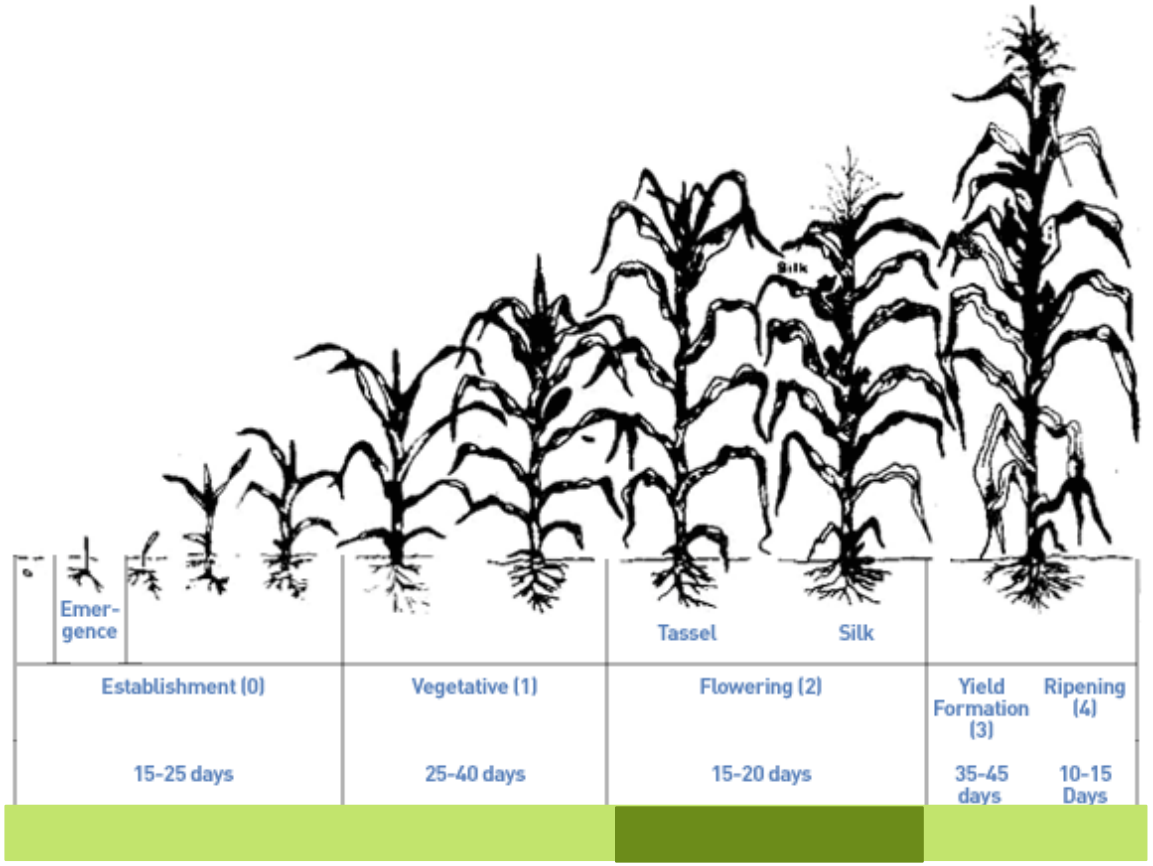
- Research Questions
  - Does protecting maize farmers from drought risk make them more willing to invest on their farms?
  - Can index insurance improve the protection against drought already offered by drought-tolerant maize (DTM) seeds?
- Market Development
  - Is it feasible to deliver cost-effective index insurance to low-income, subsistence farmers?
  - What challenges need to be overcome in order to scale-up insurance?

DTM & DTMII



- DTM provides protection against drought during the flowering stage of maize growth.
- Maize is still vulnerable to weather stress over the rest of the production cycle.

DTM & DTMII

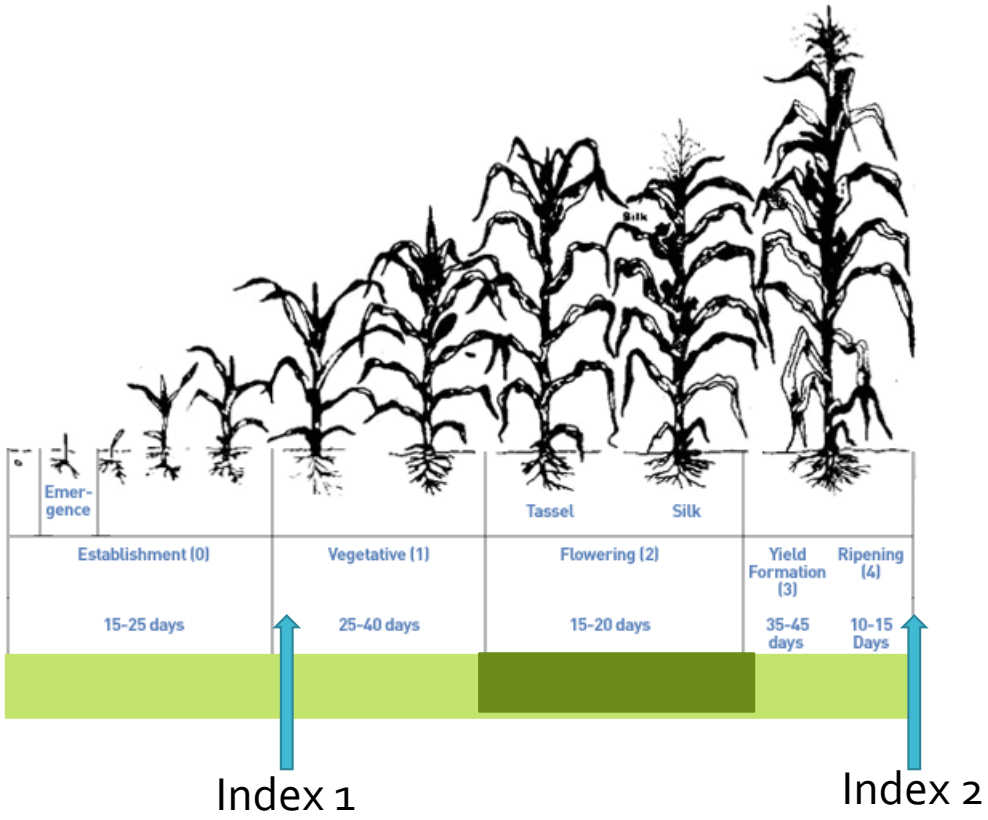


- Pairing index insurance (II) with DTM can extend protection to the rest of the growing season.

Two Indices

- Index 1: Early season drought
- Index 2: End of season predicted area yield
- Indices measured at contract zone level
- Payoff made if *either* index is triqqered

The index insurance contract



The index insurance contract

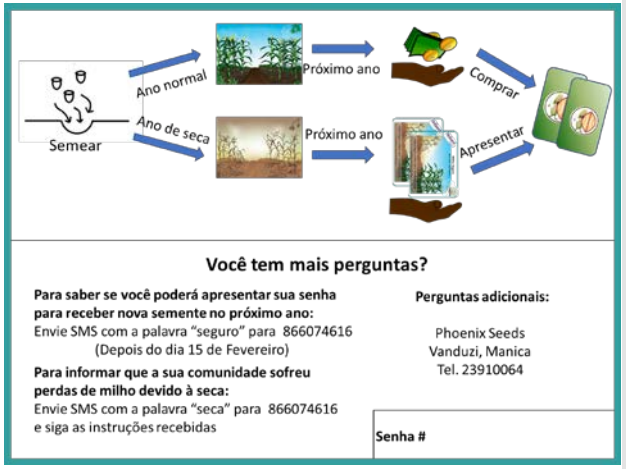
Insurance *bundled* with seed purchase

- Purchase seed = purchase insurance
- Insurance covers the value of the seed
- Premium = 20% of insured value (price of seed)
- Seed company remits premium to insurance company at end of sales period.
- Work with 2 varieties of DTM
  - ZM 523 (OPV from Hollard)
  - PRIS 601 (Hybrid from K2)

The index insurance contract

The indemnity payment

- Seed replaced the following year
- Farmers trade voucher for new seeds
- Seed company sends vouchers to insurance company for reimbursement



Research Design

- Randomized controlled trial with 2 treatment arms
- 64 communities randomly assigned to 1 of 3 groups:
  - Treatment 1 (T1): Only DTM marketed
  - Treatment 2 (T2): Bundled DTM-with-insurance marketed
  - Control: Yearly surveys but no marketing
- 1,344 sample households (21 hh/commun x 64 communities).

Research Design

Study Locations

- Nhamatanda District, Sofala
- Machaze District, Manica

Research Design

Marketing Through Community Meetings

- Invitations distributed to each sample household via extension agent & community leader
- Community Meetings included:
  - Information about DT seeds and recommended practices (T1 & T2)
  - Information about insurance (T2)
  - Opportunity to purchase seeds (OPV & Hybrid)
- Each year, sample households picked discount from a lottery
  - 10% discount (20% chance)
  - 25% discount (60% chance)
  - 50% discount (20% chance)

Information session about DT Maize

Participatory game to teach about index insurance

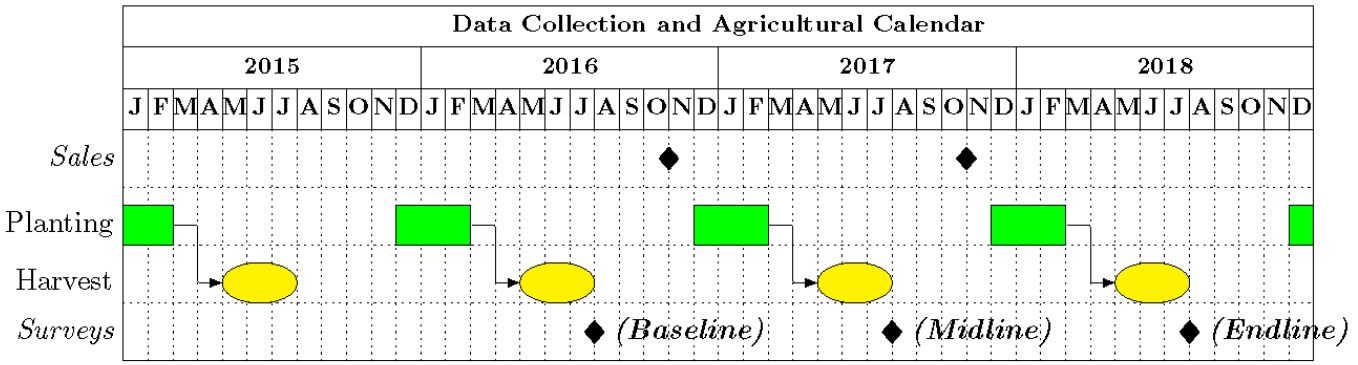
Transportation of seeds to communities

Sale of insured seed and registration of insured farmers

Research Design

Research Calendar

- 2016
  - July: Baseline Survey (15-16 campaign)
  - Oct: Year 1 of Seed Sales
- 2017
  - July: Midline Survey (16-17 campaign)
  - Oct: Year 2 of Seed Sales
- 2018
  - July: Endline Survey (17-18 campaign)



Research Design

Household Characteristics

- Relatively poor
  - 78% below the poverty line
  - Only 56% have cell phone
  - High levels of food insecurity
- Primarily subsistence farmers
  - 1-2 ha of maize
  - Mainly use local/saved seeds
  - Minimal access to credit

Sales Summary

Drought-Tolerant Maize Price Schedule: 2017-18 season

	Seed Only	Seed with Insurance
Phoenix Seeds (OPV, ZM 523)	80 MTS	90 MTS
Klein Karoo (Hybrid,PRIS 601)	150 MTS	180 MTS

Sales Summary

T1 Communities (DTM Only)

Purchase Quantities (kg)

	2016		2017	
	ZM523 (OPV)	PRIS 601 (Hybrid)	ZM523 (OPV)	PRIS 601 (Hybrid)
Machaze	839	116	318	69
Nhamatanda	302	47	124	67
Total	**1141**	**163**	**442**	**136**

T2 Communities (DTM-II Bundle)

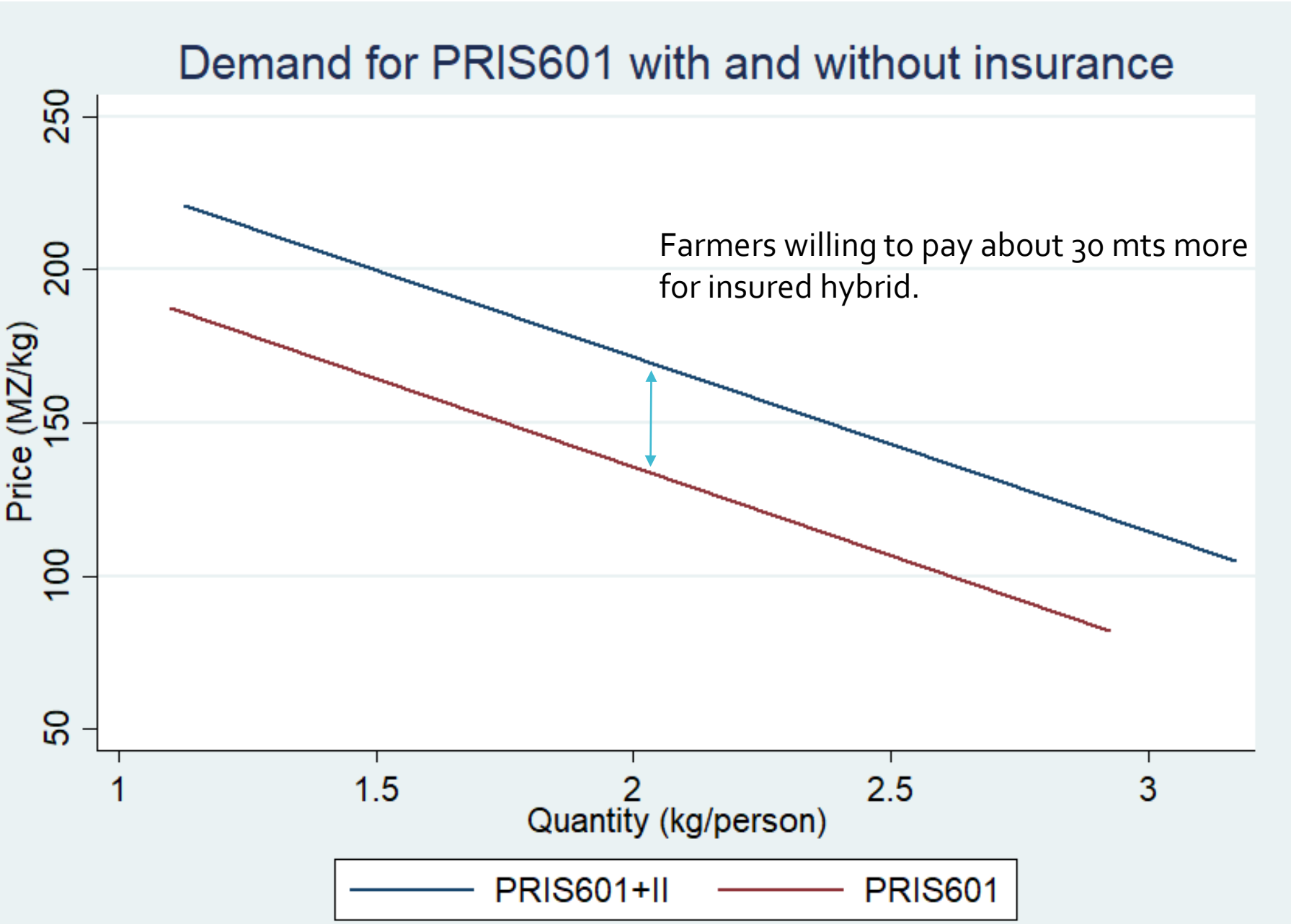
Purchase Quantities (kg)

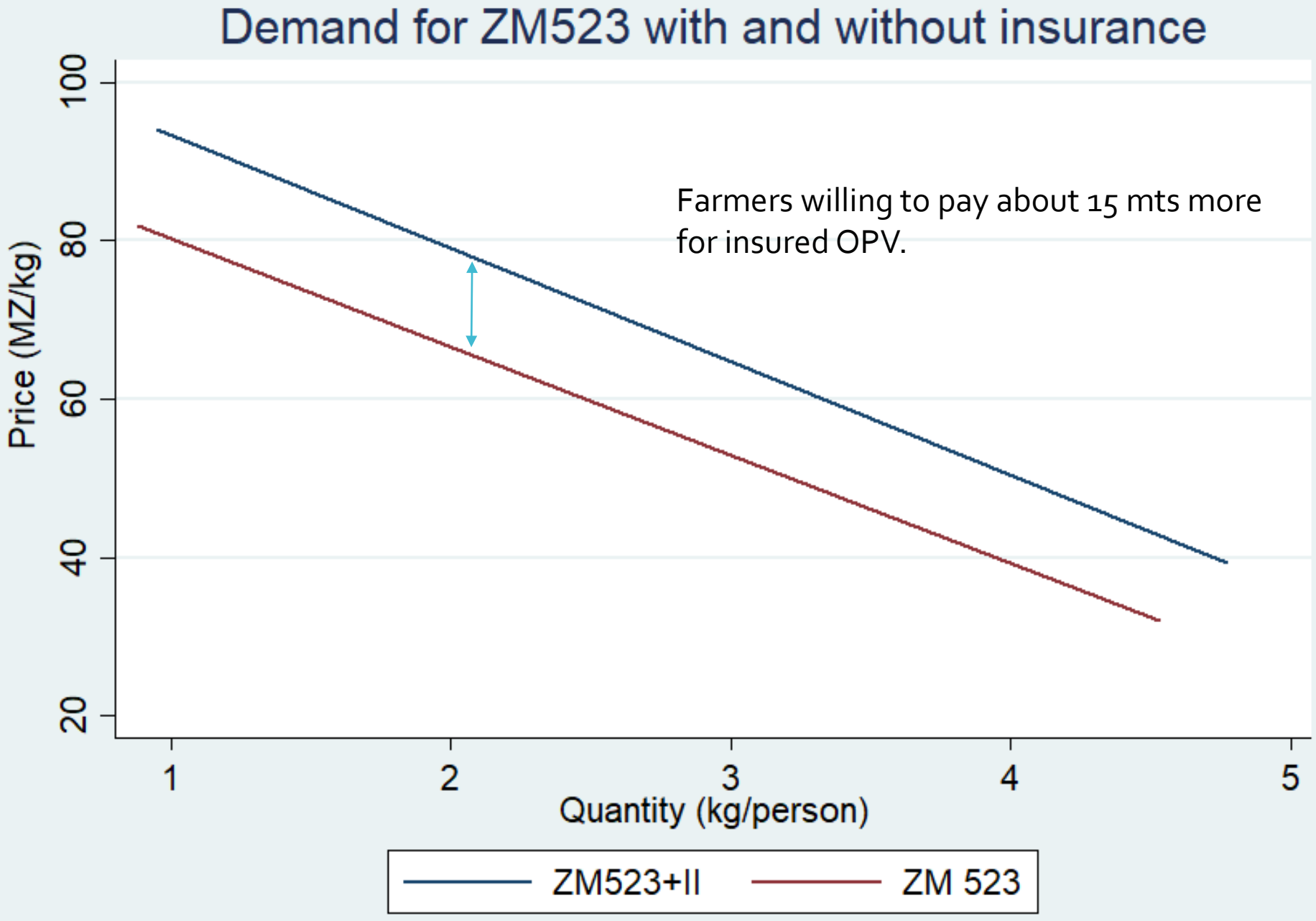
	2016		2017	
	ZM523 (OPV)	PRIS 601 (Hybrid)	ZM523 (OPV)	PRIS 601 (Hybrid)
Machaze	692	107	172	7
Nhamatanda	395	53	103	41
Total	**1087**	**160**	**275**	**48**

Demand Analysis

Purchase Amounts per Farmer

Volume Purchased (kg)	2016 (N=776)	2017 (N=316)
1	46%	54%
2	27%	24%
3 – 5	15%	16%
6 – 10	8%	2%
> 10	4%	4%
Mean	3.3 kg	2.8 kg
Median	**2 kg**	**1 kg**


Demand for PRIS601 with and without insurance
Farmers willing to pay about 30 mts more for insured hybrid.
Price (MZ/kg)
250
200
150
100
50
1
1.5
2
2.5
3
Quantity (kg/person)
PRIS601+II
PRIS601


Demand for ZM523 with and without insurance
Price (MZ/kg)
100
80
60
40
20
1
2
3
4
5
Quantity (kg/person)
Farmers willing to pay about 15 mts more for insured OPV.
ZM523+II
ZM 523

Understanding of Insurance Contract: Basis Risk

If the whole community has a bad production year and you also have a bad production year, would you receive an insurance payment?	
No	19.23%
Yes	80.77%

If the whole community has a good production year and you also have a good production year, would you receive an insurance payment?	
No	83.17%
Yes	16.83%

If the whole community has a good production year, but you personally have a bad production year, would you receive an insurance payment?	
No	68.60%
Yes	31.40%

If the whole community has a bad production year, but you personally have a good production year, would you receive an insurance payment?	
No	50%
Yes	50%

Main Takeaways from Pilot

- Farmers are very concerned about drought, so the benefits of DT and DTII would seem relevant.
- Farmers are willing to experiment: Most bought DT at least once:
  - 65% in DT only communities
  - 53% in DT II communities
- But amount of DT seeds purchased very small:
  - median = 2 kg; median total = 32 kg
- Impacts of DT and DTTII on production and yields negligible because of small amounts purchased.

Main Takeaways from Pilot

Factors affecting seed and insurance demand

- Characteristics of study communities
  - High poverty rates
  - Lack of liquidity/credit
  - Poor infrastructure and lack of access to complementary inputs
  - Maize production primarily for subsistence
- Use of retained/saved seeds still strong among subsistence households
  - Farmers may be less willing to pay for improved seeds when they have saved seed (OPV)
  - Might expect counter-cyclical patterns? (purchase more after bad year)
- Demand for insurance (biological in DT seed and especially index insurance) may require patience
  - Farmers need to learn about both types of insurance (biological & financial)
  - Bad year with lots of payouts may be required for farmers to learn and to build trust

Main Takeaways from Pilot

Price Sensitivity & Value of Insurance

- The random price discounts allowed us to estimate farmers' sensitivity to price:
  - Demand elasticities around -1
  - Increase in price accompanied by proportional decrease in demand.
  - Liquidity constraints may be important driver of this price sensitivity
- Farmers value the insurance.
  - Their WTP for is close to the market premium.
  - Thus the higher price of insured seed does not significantly reduce demand.
- This WTP constitutes initial "proof of concept".

The Path Forward

The Path Forward: Issues to Consider

- What is the ideal model moving forward?
  - Bundled or unbudled?
  - Limit coverage to seed or allow farmers to choose additional coverage?
- How do move forward in a cost-effective manner?
  - Training & Delivery/registration of product
- How will insured seed be distributed?
  - Directly by seed companies?
  - By Agro-dealers?
  - By Village Based Agents?