Demand for Insurance Products

BREAD-IGC Virtual Ph.D. Course

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Today's class*

1. Motivation: the puzzle of low demand for agricultural insurance
2. Addressing the puzzle: the timing of premium payment
3. Insurance renewal

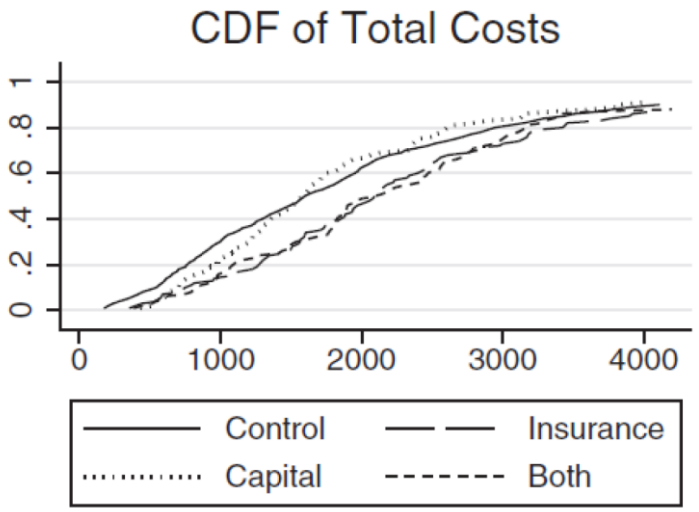
** Thanks to Jing Cai, Arianna Ornaghi, and Jack Willis for sharing slides.*

PART 1

The puzzle of low demand

Back to Karlan *et al.* (2014)

- When farmers get insurance for free or through high subsidies, investment and output go up (also in other studies)



Back to Karlan *et al.* (2014)

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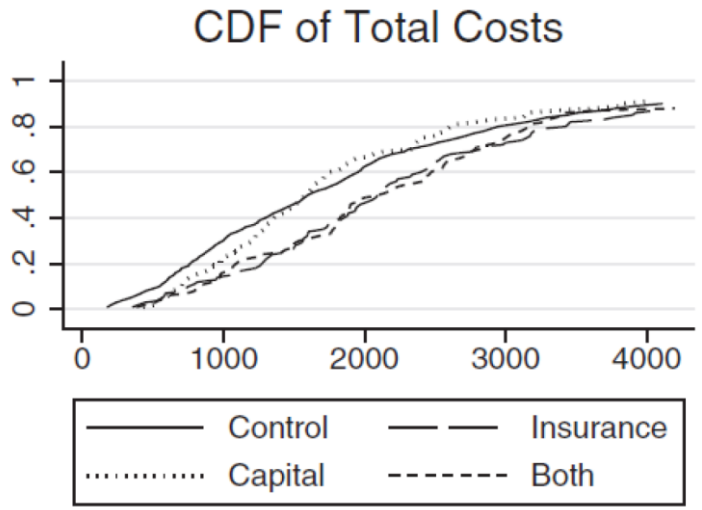
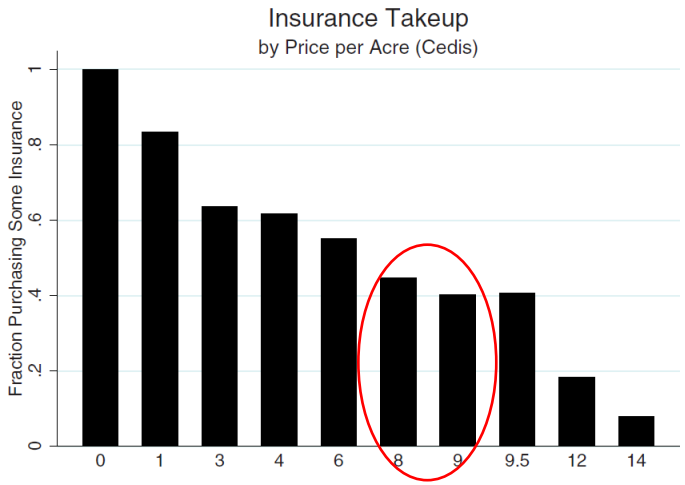
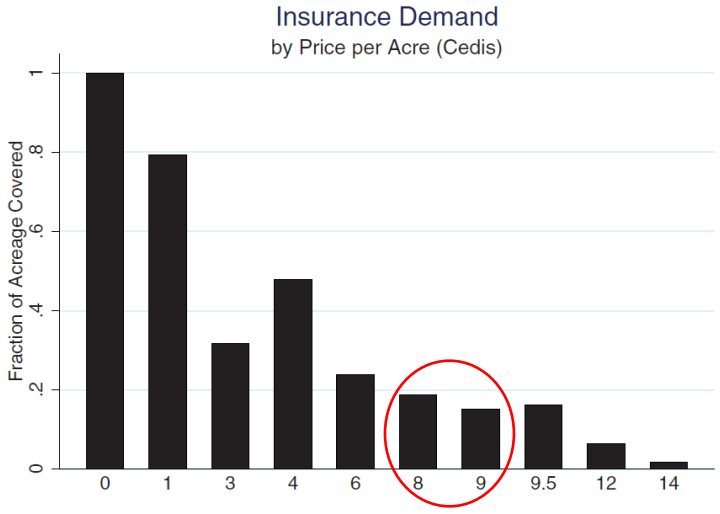
- In spite of these positive effects, demand for crop insurance is low when farmers must pay actuarially fair prices to get it.







- Actuarially fair

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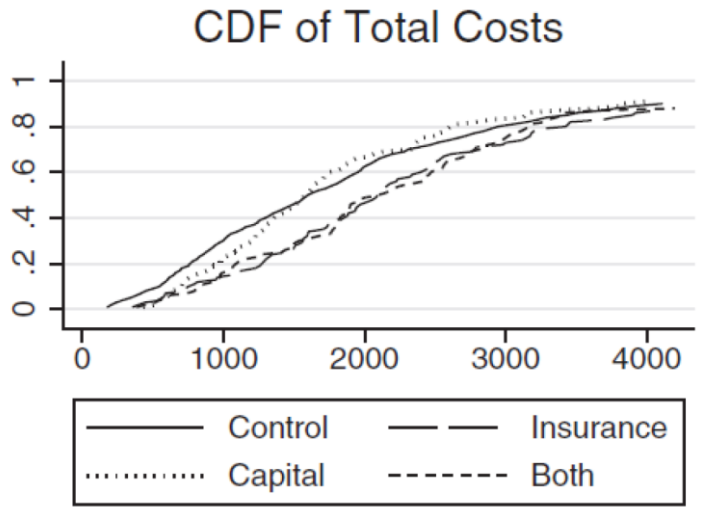

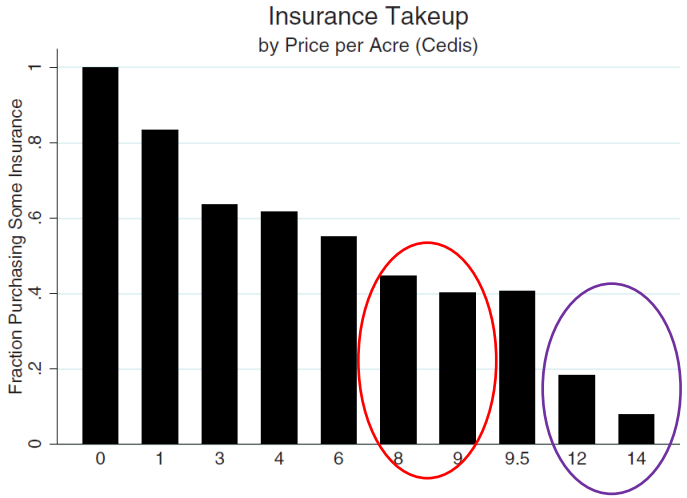

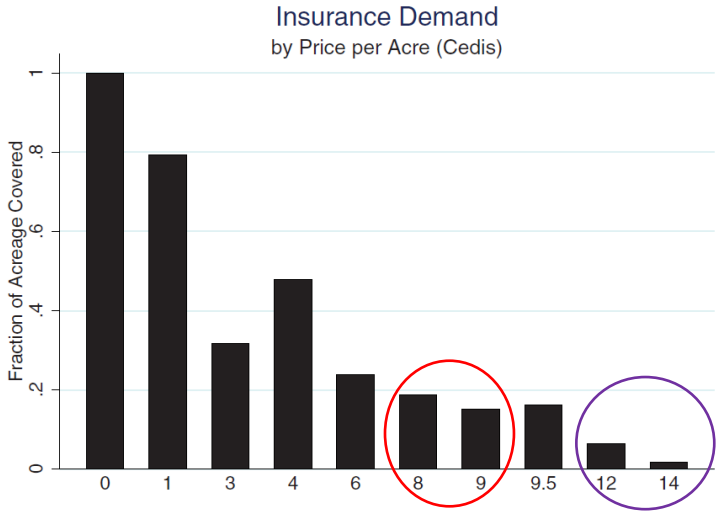

- Actuarially fair
- Market price (includes distribution costs, etc.)

Why low demand?

- Many other studies find low demand for crop insurance, even when farmers appear to benefit from it

- A large literature has tried to explain the puzzle. We will review some explanations and then dig in into one of these.

Explaining low demand: Basis risk

- In index insurance, payouts depend on an index, which is only *imperfectly correlated* with farmer's loss.
  - The mismatch between the index and the loss is called "basis risk"
- Basis risk worsens the worst-case outcome → an extremely risk-averse person may not want to buy insurance(Clarke, 2016)

TABLE 2—FOUR STATE FRAMEWORK

State s	$L0$	LI	00	$0I$
Probability π_s	r	$p - r$	$1 - q - r$	$q + r - p$
Wealth, no indexed cover	$w - L$	$w - L$	w	w
Wealth, indexed cover of αL	$w - P - L$	$w - P - L + \alpha L$	$w - P$	$w - P + \alpha L$

- RCT varying basis risk (Mobarak and Rosenzweig, 2013, India)

Explaining low demand: Prices and liquidity

- Cole *et al.* (2013, India) vary price discounts. Demand is low and very elastic

TABLE 6—EXPERIMENTAL RESULTS FOR VIDEO TREATMENTS, GUJARAT

	Baseline		With interactions	
	(1)	(2)	(3)	(4)
Panel A. Regression estimates				
Discount (fraction of initial price)	0.307***	0.340***	0.372**	0.405**
	(0.076)	(0.075)	(0.148)	(0.151)
Implied price elasticity of demand	1.04	1.16		

  - Demand would be low even if payout/premium ratio was very high (U.S. level)
  - Plus, when farmers buy, they buy insurance for a very small portion of their land
- A randomized cash grant large enough to cover the premium raises take up substantially, suggesting that liquidity constrains may matter (+ social desirability?)

Explaining low demand: Prices (cont'd)

- Banerjee *et al.* (2021) studies how to increase enrollment in government health insurance in Indonesia, which has a weakly enforced individual mandate.
- *Time-limited* subsidies, valid for two weeks, increase enrollment by 18.6 p.p. (from a base of 7.8%)

Explaining low demand: Prices (cont'd)

- Banerjee *et al.* (2021) studies how to increase enrollment in government health insurance in Indonesia, which has a weakly enforced individual mandate.
- *Time-limited* subsidies, valid for two weeks, increase enrollment by 18.6 p.p. (from a base of 7.8%)
- In the control group, people are more likely to enroll when they are sick. This increases costs (adverse selection). Subsidies help address this strategic enrollment

	Had a claim			Total number of claims		Claims	
	Self-reported health (1)	Of any type (2)	Chronic (3)	Of any type (4)	Chronic (5)	Value of claims (6)	Days to first claim (7)
Full subsidy	3.237	0.480	0.171	3.589	0.184	0.986	232.425
	[0.452]	[0.501]	[0.377]	[6.805]	[0.429]	[2.620]	[141.273]
Half subsidy	3.244	0.511	0.231	4.698	0.292	1.879	213.850
	[0.541]	[0.501]	[0.422]	[10.326]	[0.624]	[4.712]	[150.106]
No subsidy	3.099	0.622	0.272	6.167	0.339	1.637	176.272
	[0.538]	[0.486]	[0.446]	[9.712]	[0.600]	[4.064]	[154.913]

Explaining low demand: Trust

- Few farmers have had exposure to any insurance product before. They may not trust the insurer. For instance, they may fear the insurer will run away with the premium money and default
  - Note: the upfront premium payment puts all the moral hazard on the insurer

- Cole *et al.* (2013) also randomized whether insurance is endorsed by a local well-known NGO. This increases take up to some extent (+10 p.p.)

Explaining low demand: Administrative challenges

- In the Indonesia health insurance study we saw earlier, Banerjee *et al.* (2021) also randomized assistance for the online registration. This leads to a 3.5 p.p. increase in enrollment

- However, the treatment also led many people to try to register *unsuccessfully*.
  - Technical and administrative challenges in the online enrollment system
  - Inaccurate and obsolete state civil registry → people would need to visit an office to fix errors on family composition, etc.. ("State capacity" in practice...)

Explaining low demand: Informal insurance

- In the previous class with Chris Udry, you discussed the scope and performance of risk-sharing arrangements, e.g., across members of the same village
- Could “informal-insurance” explain low demand for insurance products?
- Not clear: Informal insurance may work well in covering idiosyncratic risk, not aggregate risk. Informal insurance may complement insurance products that present basis risk
- Mobarak and Rosenzweig (2012): communities where risk-sharing arrangement protect well for local risk have *higher* demand for insurance

Taking stock

- Other channels: social networks, financial literacy, …
- Addressing price and non-price barriers appears to increase take up to some extent, but demand for insurance remains low
- Does it mean the poor do not value risk management products?

PART 2

The timing of premium payments

Time vs. State in Insurance

Experimental Evidence from Contract Farming in Kenya

Lorenzo Casaburi - *University of Zurich*

Jack Willis - *Columbia University*

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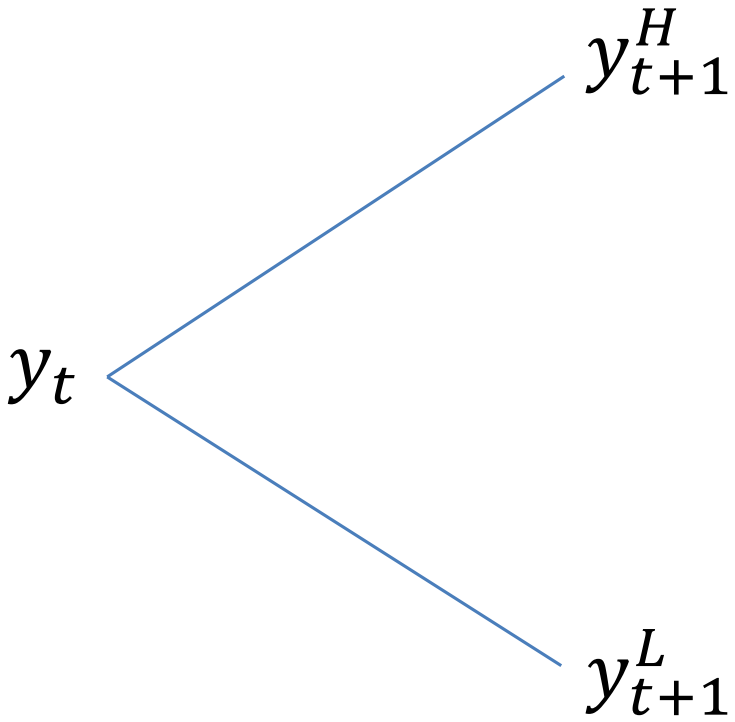
Time vs. state in insurance



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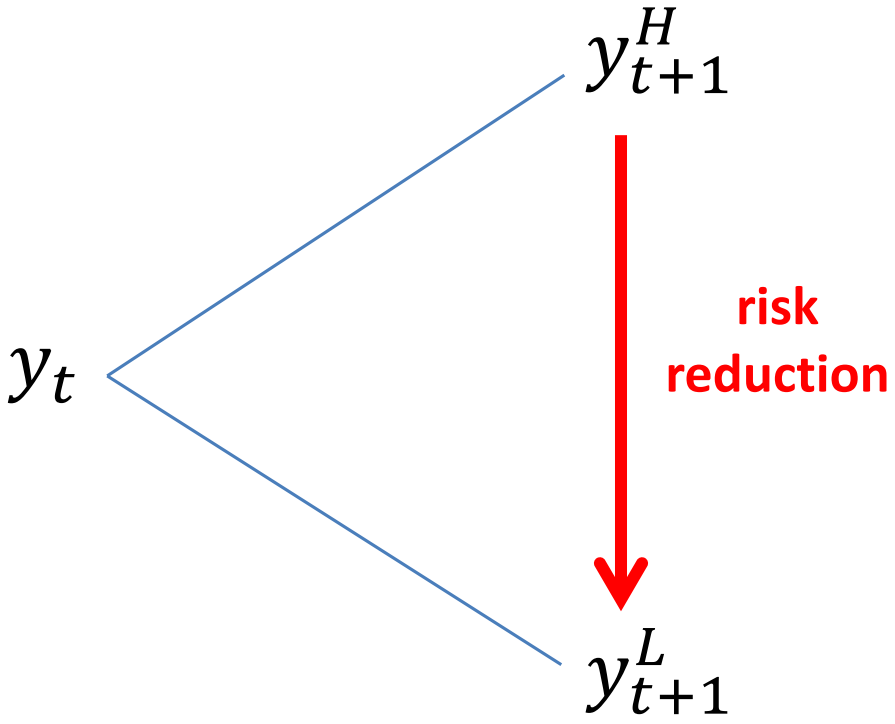
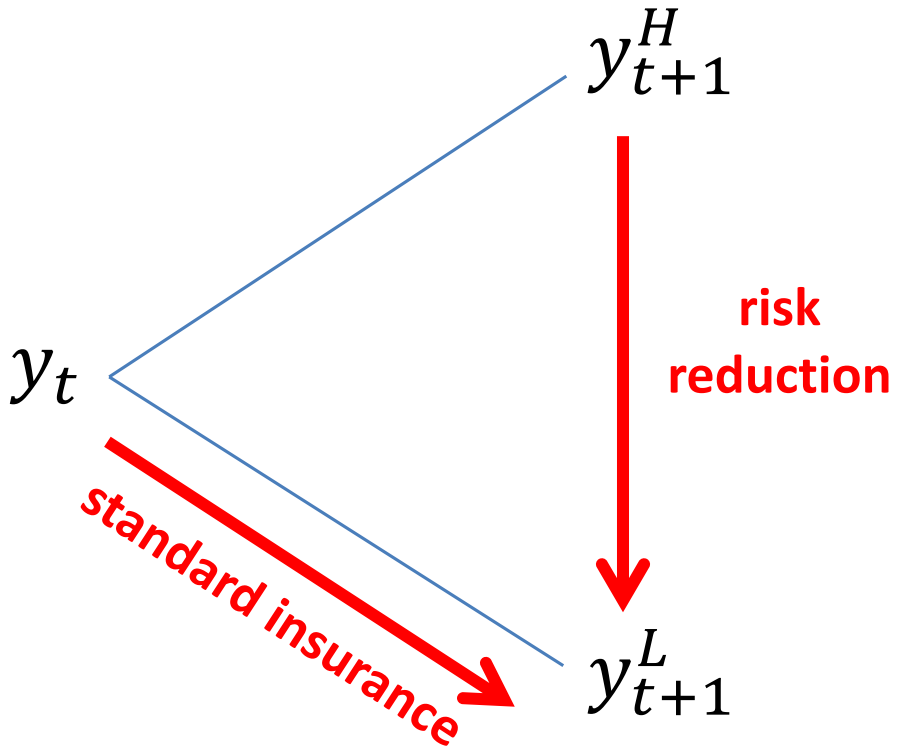


- The goal of insurance is risk reduction, a transfer across **states**

Time vs. state in insurance



- The goal of insurance is risk reduction, a transfer across **states**
- But standard insurance products also transfer income across **time**
  - Pay the premium upfront, for an uncertain payout in the future

What does the transfer across time in insurance do?

- Charging the premium upfront ensures the premium gets paid
- But, in doing so, it also:
  - places all the contract risk on the buyer
  - activates intertemporal factors, e.g. liquidity constraints, present bias
- So, it may help to explain why people who would benefit from risk reduction often do not buy insurance, e.g. the poor

Research Questions

- Does transfer across time affect insurance demand? Why? For whom?

Why our setting, crop insurance, is interesting

1. Boosting demand for crop insurance is a major policy goal

- Farmers face highly risky incomes
- Yet show consistently low demand for insurance, in spite of: ▸ Details
  - large subsidies (Cole et al. 2013, Karlan et al. 2014)
  - marketing and info. campaigns (Karlan et al. 2014, Cai & Song 2016)
  - reducing basis risk (Mobarak & Rosenzweig 2012, Elabad et al. 2013)

2. The transfer across time may be particularly costly for farmers

- Farmers not only face risky incomes, they also face cyclical incomes
- Insurance helps smoothing over state but hinders smoothing over time
  - Premium due at planting, payouts received at harvest

Related literature

1. Constraints on demand for agricultural insurance
   Cai et al. (2015, 2016) Carter et al. (2015) Clarke (2016) Cole et al. (2013, 2014) Dercon et al. (2011) Elabed et al. (2013) Gine & Yang (2009) Karlan et al. (2014) Liu et al. (2016) Mobarak & Rosenzweig (2012)

2. Savings & investment decisions and present bias
   Ashraf et al. (2006) Cohen & Dupas (2010) Duflo et al. (2011) Laibson (1997) Tarozzi et al. (2014) Thaler & Benartzi (2004)

3. Tradeoff between risk management and financing
   Rampini & Viswanathan (2010, 2013, 2016) Rampini et al. (2014)

4. Interlinked contracts in developing countries
   Casaburi & Macchiavello (2019) Macchiavello & Morjaria (2020) Udry (1994)

5. Liquidity and insurance
   Ericson & Sydnor (2018)

Outline

1. Setting
2. Main experiment
3. Theory: intertemporal model of insurance demand
4. Channels: liquidity constraints and present bias
5. Channels: counterparty risk
6. Conclusion

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Setting: contract farming

Partner company

- Work with large sugar company in East Africa

Farmers

- Small-holder farmers in Western Kenya
- Very few have prior experience of insurance

Sugarcane

- $> 1/4$ of total income for 80% of farmers, $> 1/2$ for 38%
- Long crop cycle ($\sim$16 months)

Farming contract

- Farmer contracted to sell to company, which harvests the crop and pays farmer by weight
- Long-term (covers 3 cycles, 4+ years)

Interlinking and insurance

Interlinking

- As is common in contract farming, credit interlinked with contract
  - Company provides inputs to farmers on credit (fertilizer, etc.) and deducts input costs (plus interest) from harvest revenues
- **We use the same mechanism for insurance premium payment**

Insurance product

- Payout is: same across all treatments; maximum of 20% of expected revenue; partly based on an index ▸ Insurance details
- Actuarially-fair premium: 3% of expected revenue, $18 on average

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Does the timing of the premium payment matter?

Company offers insurance to 605 farmers across three treatments:

▸ Table

▸ Experimental design

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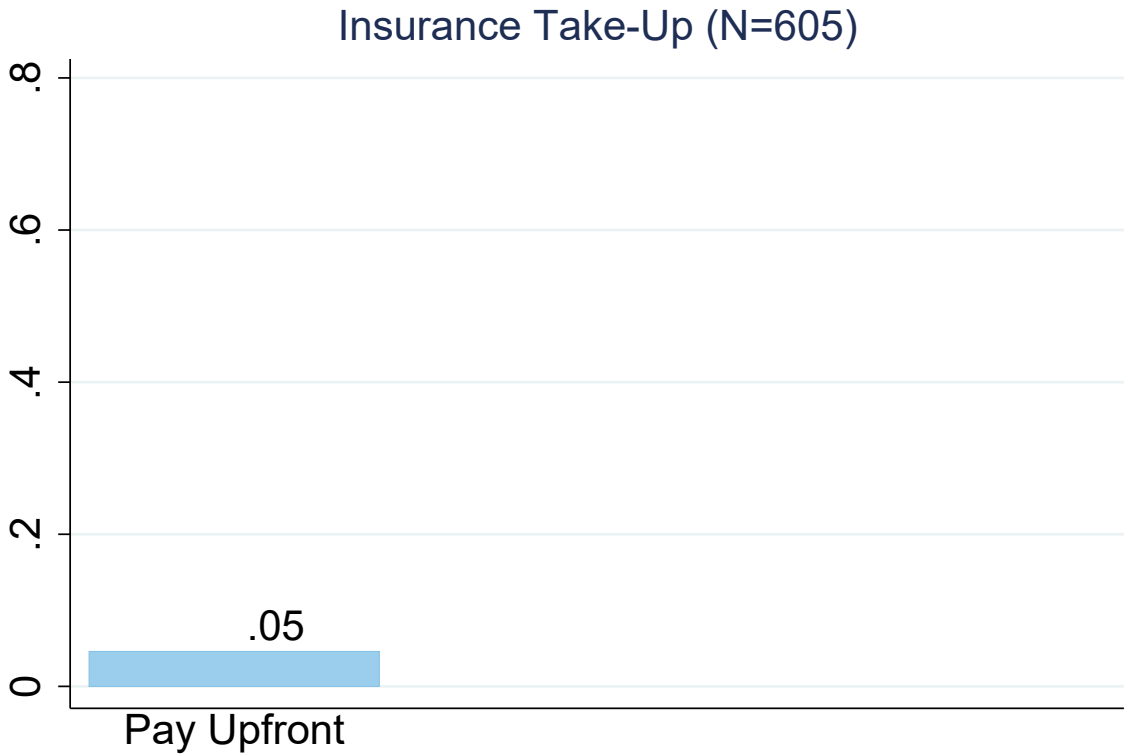

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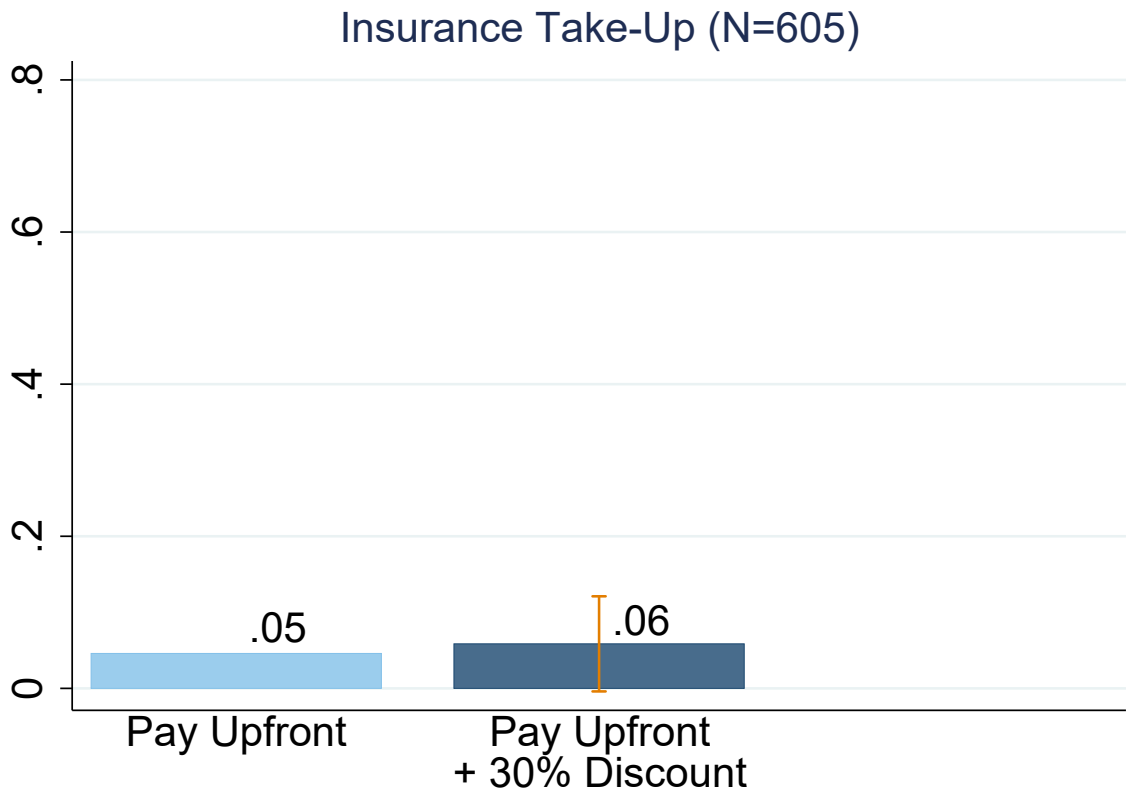

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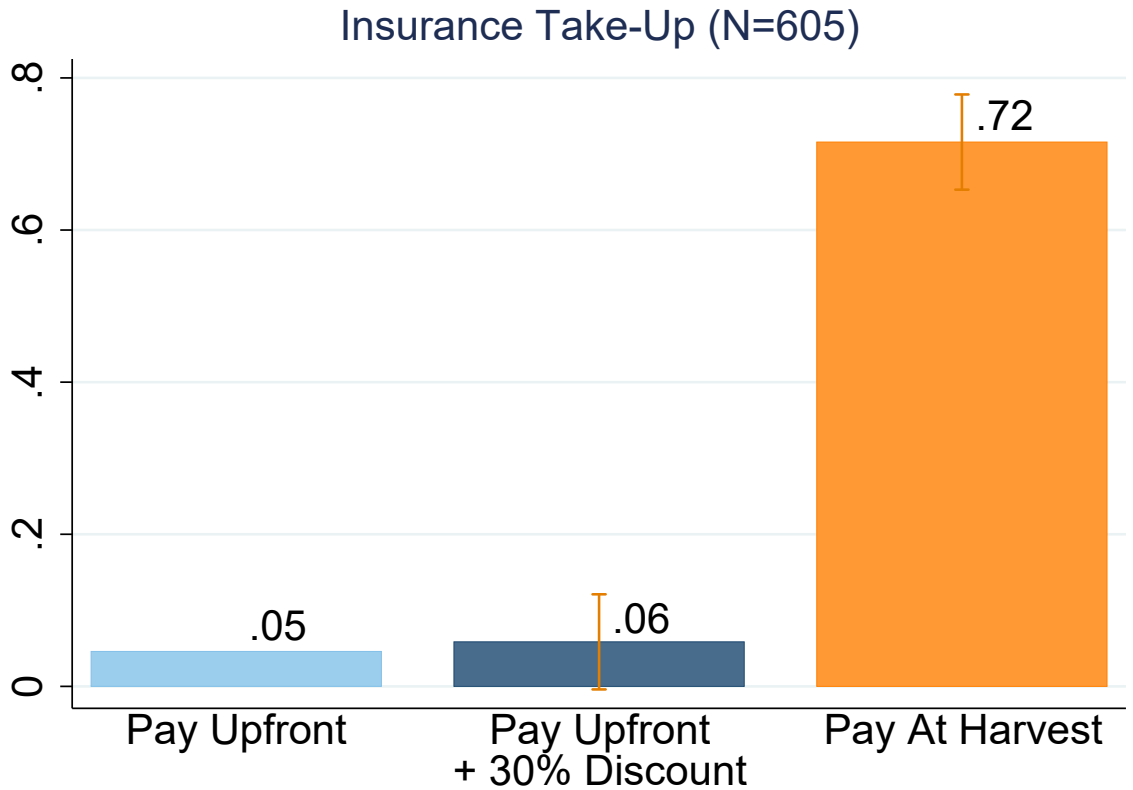

- 30% price cut in upfront premium has little effect
- High demand for risk reduction (Pay At Harvest), yet low demand for standard insurance (Pay Upfront)

▸ Table
▸ Experimental design

Multiple potential explanations

Intertemporal transfers

- Liquidity constraints

Intertemporal preferences

- Present bias - implications for optimal contract design and welfare ▸ Go

Counterparty risk

- Farmer or company may default on contract before harvest
- There was a temporary closure of factory 12 months after experiment began

Other behavioral channels

- Payment vs. deduction: relative thinking / salience / prospect theory

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Develop a model to understand the role of **these channels**, and to direct efforts to unpack them

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Intertemporal model of insurance demand

- Deaton (1991) buffer-stock savings model, with (naive) $\beta\delta$ preferences
- Introduce marginal units of pay-upfront and pay-at-harvest insurance

Implications of transfer across time

1. Liquidity constraints matter; intertemporal preferences work through them
2. Results in a tension between insurance and self-insurance
3. Can explain why demand for insurance is lower among the poor

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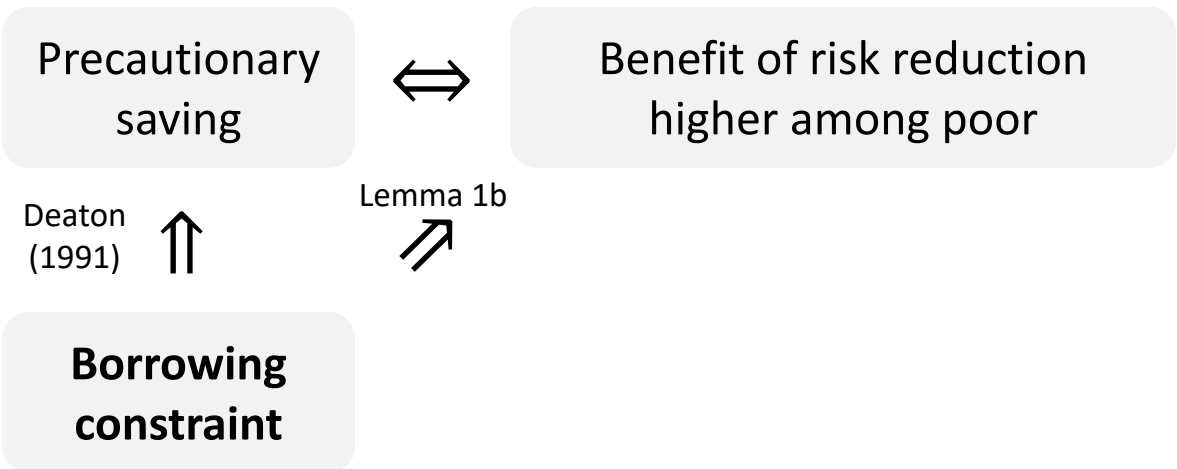

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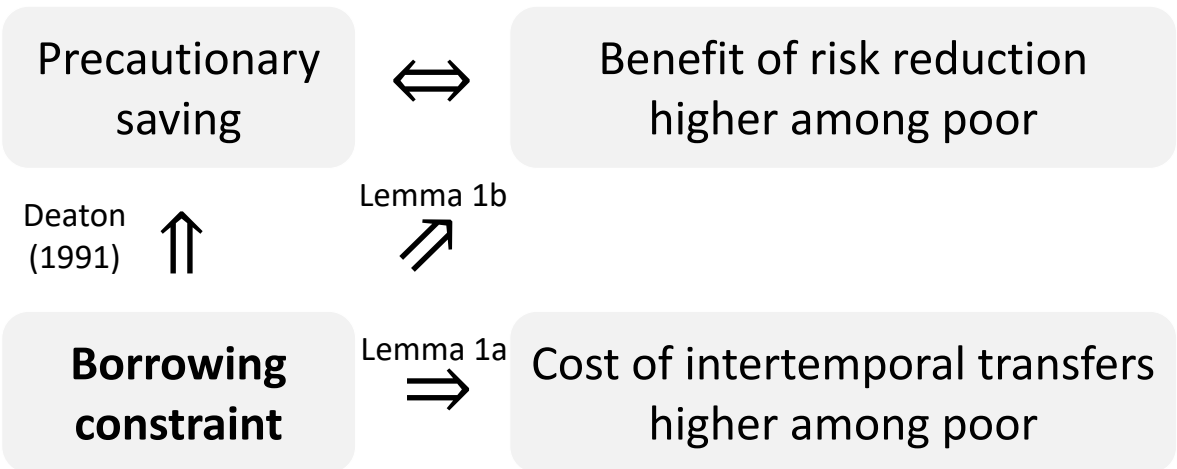

▸ Model

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Timing has larger effect for the poor / liquidity constrained

Treatment heterogeneity by proxies for wealth & liquidity constraints

(dependent variable is take-up)

	Land Cultivated	Own Cow(s)	Previous Yield	Plot Size	Portion Income from Cane	Savings for Sh1,000	Savings for Sh5,000
X*Pay At Harvest	-0.065**	-0.139*	-0.079**	-0.001	0.053*	-0.174**	-0.131
	[0.033]	[0.078]	[0.031]	[0.031]	[0.028]	[0.069]	[0.097]
X	-0.000	0.066	0.015	-0.022	-0.004	0.006	-0.016
	[0.017]	[0.044]	[0.020]	[0.019]	[0.016]	[0.043]	[0.059]
Pay At Harvest	0.706***	0.822***	0.673***	0.672***	0.540***	0.764***	0.725***
	[0.029]	[0.068]	[0.028]	[0.028]	[0.096]	[0.035]	[0.031]
Mean Y Control	0.052	0.052	0.052	0.052	0.052	0.052	0.052
Mean X	0	0.791	0	0	3.311	0.300	0.120
S.D. X	1	0.407	1	1	1.126	0.459	0.326
Observations	562	569	605	605	569	566	565

- Effect larger among the poor and liquidity constrained (through higher demand for pay-at-harvest insurance)

Do farmers just not have the cash? Experiment

Experiment on channels (1 of 2)

- Give farmers cash to be able to buy insurance (Cole et al. 2013)
  - Eases liquidity constraints, but may not remove them
  - May induce reciprocity

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Experiment on channels (1 of 2)

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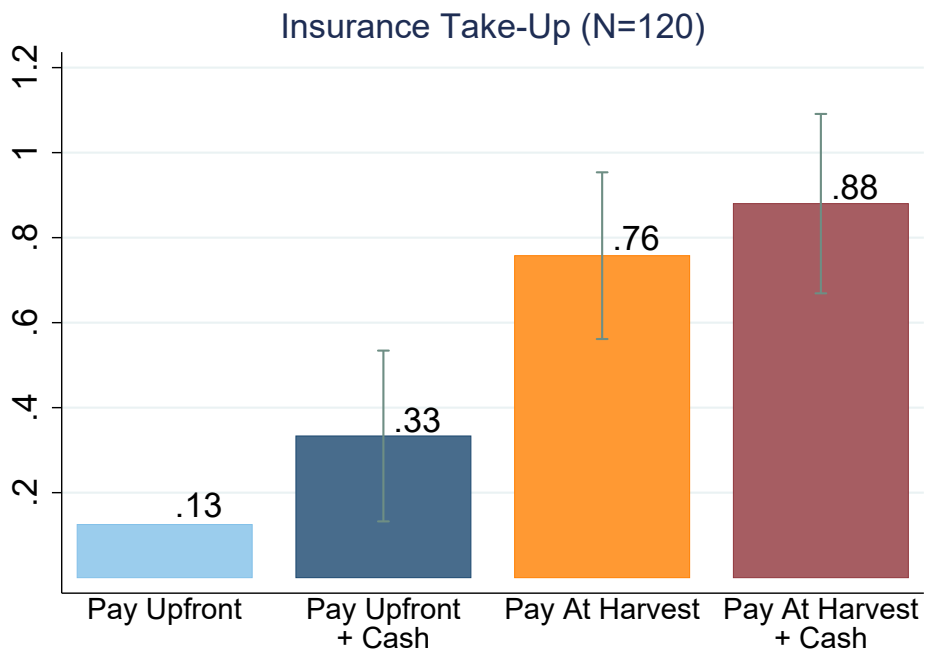
  - May induce reciprocity
- Cross-cut design, 120 farmers into 4 treatment groups



▸ Table

- Cash drops increase Pay-Upfront take-up, but effect is small once consider diff-in-diffs.

Effect of a one month delay in payment. Experiment

Experiment on channels (2 of 2)

Effect of a one month delay in payment. Experiment

Experiment on channels (2 of 2)

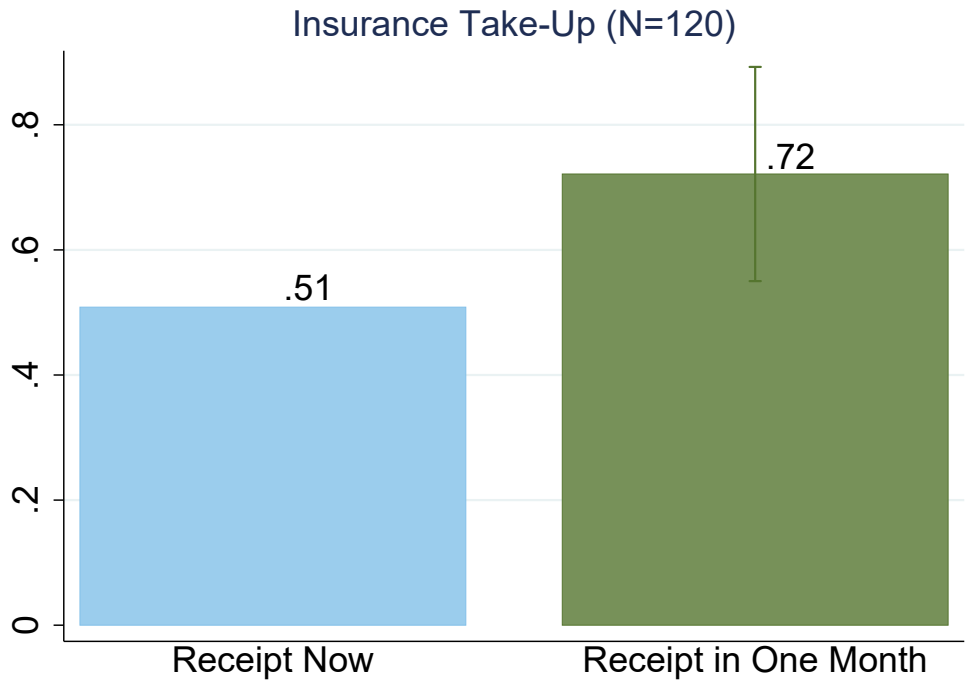
- Farmers given a choice: free insurance or value of premium in cash
- 120 farmers across 2 treatment groups:

[Now]	Receive choice now (free insurance or cash)
[One Month]	Receive choice *in one month*, but decide now

- Delaying receipt by one month:
  - akin to one month delay in premium payment, but is easily enforceable
  - **removes present bias** if liquidity constrained, no effect if not
  - has no effect on contractual risk of insurance

▸ Balance

A one month delay in payment increases take-up



- Results indicate present bias
  - Results consistent across three months, so not driven by time-varying liquidity constraints
  - If driven by small δ, why buy insurance in one month?

▸ Table

▸ MEL table

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Harvesting delays and side-selling

Interlinking means: default on insurance $\Leftrightarrow$ default on production

Harvesting delays and side-selling

Interlinking means: default on insurance $\Leftrightarrow$ default on production

- 12 months after start, the company had serious financial difficulties, leading to temporary shutdown of factory, and delays and uncertainty in harvesting
- Resulted in 53% of farmers side-selling, *much* more than historically

▸ Harvest delays ▸ Harvest map

Raises two questions:

1. Did insurance induce side-selling (to avoid premium payment)?

   No. ITT shows it did not ▸ Go

2. Did anticipation of default generate gap between Pay-Upfront and Pay-At-Harvest?

Did anticipation of default drive differential take-up?

Multiple arguments suggest any role was limited

1. Channels experiments held default risk constant, so other channels matter
   - Take up reached 72% in one month treatment group
2. No heterogeneous treatment effects by proxies for ex-ante expectations of default
   (i) Trust and relationship with company ▸ Table
   (ii) Side-selling of farmer and of farmers in local area ▸ Table
3. **Proposition 4** *Differential effect of imperfect enforcement bounded by that of a price cut in upfront premium of* $\mathbb{P}(\textit{side-sell})\frac{\mathbb{E}(u'(c_H)|\textit{side-sell})}{\mathbb{E}(u'(c_H))}$
   - But, main experiment showed demand for upfront insensitive to price
4. Finally, even if anticipation of side-selling did matter, it is unlikely to have driven high take-up of Pay-At-Harvest insurance
   - Instead it would have reduced take-up for Pay-Upfront

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Conclusion

Standard insurance products also transfer income across time

- Theoretically
  - Behind several explanations of low demand for insurance
  - Can explain particularly low demand among poor
- Empirically
  - Removing it results in v. large increase in demand, especially for poor
  - Liquidity constraints and present bias play a role

PART 3

Insurance renewal

Insurance renewal

- While most of the literature has focused on insurance demand for first-time adopters, renewals of insurance purchases presents additional challenges

- Multiple studies suggests that renewal rates are low, especially when a household or a community do not receive insurance payouts in the previous year
  - Karlan et al. (2014, Ghana), Cole et al. (2014, India), Cai and Song (2017, China)

Cole *et al.* (2014, India)

TABLE 1—EFFECTS OF PAYOUTS ON PURCHASERS AND NON-PURCHASERS

	Insurance purchasers		Insurance non-purchasers	
	(1)	(2)	(3)	(4)
Village payout per policy in previous year (Rs '000s)	0.504***	0.513**	0.255**	0.196*
	(0.139)	(0.196)	(0.107)	(0.105)
Individual payout received previous year (Rs '000s)		−0.046		
		(0.046)		
Number of insurance policies bought previous year		0.014		
		(0.014)		
Number of households in village who received a payout previous year		0.003		0.005***
		(0.002)		(0.002)
Revenue lost due to crop loss previous year (Rs '0,000s)		−0.011		−0.004
		(0.016)		(0.011)
Mean village revenue lost due to crop loss previous year (Rs '0000s)		0.027		0.063
		(0.049)		(0.040)
Individual fixed effects	Yes	Yes	Yes	Yes
R^2	0.167	0.171	0.187	0.196
Observations	2,085	2,085	3,574	3,574

Cole *et al.* (2014, India)

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Individual fixed effects	Yes	Yes	Yes	Yes
R^2	0.167	0.171	0.187	0.196
Observations	2,085	2,085	3,574	3,574

Cole *et al.* (2014, India)

TABLE 1—EFFECTS OF PAYOUTS ON PURCHASERS AND NON-PURCHASERS

	Insurance purchasers		Insurance non-purchasers	
	(1)	(2)	(3)	(4)
Village payout per policy in previous year (Rs '000s)	0.504***	0.513**	0.255**	0.196*
	(0.139)	(0.196)	(0.107)	(0.105)
Individual payout received previous year (Rs '000s)		−0.046		
		(0.046)		
Number of insurance policies bought previous year		0.014		
		(0.014)		
Number of households in village who received a payout previous year		0.003		0.005***
		(0.002)		(0.002)
Revenue lost due to crop loss previous year (Rs '0,000s)		−0.011		−0.004
		(0.016)		(0.011)
Mean village revenue lost due to crop loss previous year (Rs '0000s)		0.027		0.063
		(0.049)		(0.040)
Individual fixed effects	Yes	Yes	Yes	Yes
R^2	0.167	0.171	0.187	0.196
Observations	2,085	2,085	3,574	3,574

How do subsidies affect subsequent adoption?

- Several papers have examined the impact of initial subsidies on subsequent adoption of health and agricultural products:
- Positive effects of higher subsidies
  - Habit formation (Dupas et al 2013, on dilute chlorine solution).
  - Higher immediate coverage and more opportunities to learn: Dupas (2014) for bed nets, Carter et al. (2021) for fertilizer and improved seeds.
- Negative effects of higher subsidies:
  - Lower learning because subsidies may undermine usage ("sunk cost", though not much evidence for them)
  - Price anchoring (Fischer et al., 2019)

Subsidies and future adoption under stochastic benefits

- How do initial subsidies affect insurance renewals?
- The effect of initial subsidies may depend on the realization of the benefits in the first year (i.e., on whether the insurance pays out)
- Cai et al. (2021) examine these questions in a RCT in China

Experimental Design

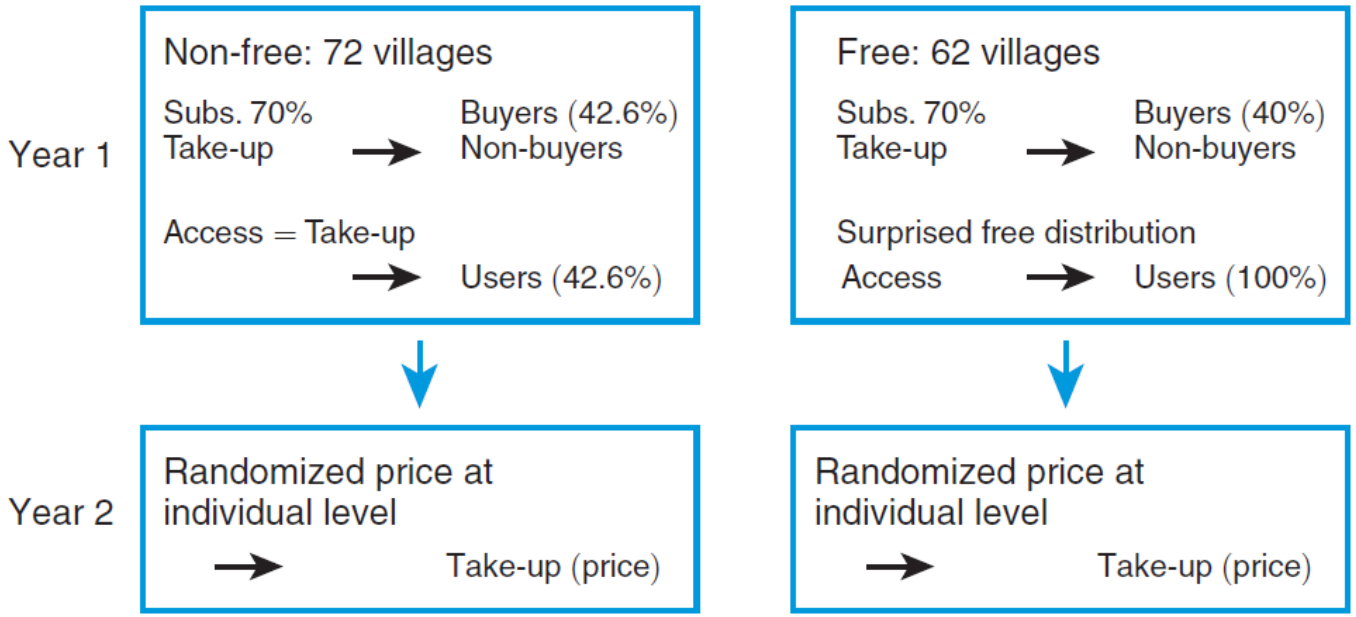

FIGURE 1. EXPERIMENTAL DESIGN

- Year 1: some villages get insurance for free, others pay (70% discount)
- Year 2: randomized prices
- Data collection for 4 years
- Also randomize *financial education* in year 1

Result 1: year-1 subsidies increase demand in year 2

TABLE 3—EFFECT OF FIRST YEAR SUBSIDY POLICIES ON SECOND YEAR INSURANCE DEMAND

Dependent variable:	Insurance take-up year 2 (1 = yes, 0 = no)		
Sample: All	(1)	(2)	(3)
Price (RMB/mu)	−0.0487	−0.0489	−0.0509
	(0.00545)	(0.00538)	(0.00759)
Free year 1 (1 = yes, 0 = no)	0.0597	0.0568	0.0388
	(0.0304)	(0.0306)	(0.0507)
Price × free year 1			0.00442
			(0.0106)

- Col 1-2: positive treatment effects on year-2 take up

Result 1: year-1 subsidies increase demand in year 2

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	(0.0304)	(0.0306)	(0.0507)
Price × free year 1			0.00442
			(0.0106)

- Col 1-2: positive treatment effects on year-2 take up
- Col. 3: no change in price elasticities

Result 2: year 1 payouts increase year 2 demand and reduce price elasticity

TABLE 4—EFFECT OF RECEIVING PAYOUTS ON SECOND YEAR INSURANCE DEMAND

Dependent variable:	Insurance take-up year 2 (1 = yes, 0 = no)						
	Non-free year 1			Free year 1			All sample
Sample: insurance take-up year 1 = yes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Price	−0.0441	−0.0778	−0.0716	−0.0469	−0.0639	−0.0673	−0.0464
	(0.00868)	(0.0137)	(0.0135)	(0.00998)	(0.0196)	(0.0217)	(0.00656)
Payout (1 = yes, 0 = no)	0.368	0.102	0.204	0.168	0.0479	0.0613	0.368
	(0.0355)	(0.0827)	(0.109)	(0.0406)	(0.0860)	(0.124)	(0.0349)
Price × payout		0.0642	0.0526		0.0306	0.0360	
		(0.0166)	(0.0179)		(0.0224)	(0.0262)	
Free year one (1 = yes, 0 = no)							0.102
							(0.0479)
Payout × free year one							−0.172
							(0.0566)
Loss rate in yield			−0.00198			0.00480	
			(0.00303)			(0.00493)	
Square of loss rate in yield			0.000023			−0.000067	
			(0.000031)			(0.00005)	
Mean value of dependent variable	0.499	0.499	0.499	0.563	0.563	0.563	0.528
Observations	790	790	790	632	632	632	1,422
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.243	0.263	0.261	0.128	0.133	0.137	0.17
p-value of joint significance test: price and price × payout		0.0000	0.0000		0.0001	0.0001	
Payout and price × payout		0.0000	0.0000		0.0004	0.0276	
Payout and payout × free							0.0000
Free and payout × free							0.0098

Result 3: year 1 subsidies mitigate the "payout effects"

TABLE 4—EFFECT OF RECEIVING PAYOUTS ON SECOND YEAR INSURANCE DEMAND

Dependent variable:	Insurance take-up year 2 (1 = yes, 0 = no)						
	Non-free year 1			Free year 1			All sample
Sample: insurance take-up year 1 = yes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
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	(0.00868)	(0.0137)	(0.0135)	(0.00998)	(0.0196)	(0.0217)	(0.00656)
Payout (1 = yes, 0 = no)	0.368	0.102	0.204	0.168	0.0479	0.0613	0.368
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Price × payout		0.0642	0.0526		0.0306	0.0360	
		(0.0166)	(0.0179)		(0.0224)	(0.0262)	
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p-value of joint significance test: price and price × payout		0.0000	0.0000		0.0001	0.0001	
Payout and price × payout		0.0000	0.0000		0.0004	0.0276	
Payout and payout × free							0.0000
Free and payout × free							0.0098

- In addition, payout to network links only matters for those who did not have insurance in year 1

Explaining the interaction between subsidies and payout experience

- Free insurance increases the likelihood of getting insurance. This may increase familiarity with the product, experience, etc.

- However, households receiving free insurance appear to pay less attention to insurance outcomes and this may reduce the salience of payouts
  - This reduces future demand if there is a payout in year 1, …
  - … but increases future demand if there is no payout in year 1

- Little evidence of price anchoring based on year 1 subsidy

Result 4: long-term effects of experiencing a payout

- Experiencing a payout in year 1 has a long-term on subsequent take up (3 years), but only for farmers who received financial education about insurance. For farmers who did not receive education, the effect decays over time
- Interpretation:
  - For farmers with financial education, a payout reinforces understanding of the insurance
  - For those without financial education, a payout may make adverse events more salient, but this effect is short-lived
- Policy implications:
  - Optimal subsidy design may depend on frequency of payouts
  - Subsidies may raise long-term adoption, especially when combined with complementary interventions (financial education)

Areas for future research

- Can the shift in premium payment be achieved and enforced in other settings?
  - E.g., Cooperatives, microfinance, etc. Bundling insurance with other products?

- Other types of insurance are likely to become more important in developing countries in the near future: motor insurance, theft insurance, data protection insurance. Very little academic work on these topics

- Political economy of insurance? A lot of insurance programs are administered by governments. Does insurance provision increase government support? Do expectations that governments will step in after a natural disaster limit demand for insurance? How do governments negotiate reinsurance contracts?