Pisco Sour?
Insights from an Area Yield Pilot program in Pisco, Peru

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Pilot Insurance Project in Peru

- UC-Davis and Instituto de Estudios Peruanos (Financed by USAID)
- General Idea:
  - Create a local (pilot) market for area yield insurance;
  - Identify institutional barriers to offering insurance;
  - Evaluate impacts of insurance on farmers' outcomes
    - Credit rationing, investment, assets, …
  - Generate learning that will help decide whether or not to scale up and, if so, how?
- We started in August, 2008…uptake has been quite low.
- Here I'll discuss
  - Design of insurance contract;
  - Design and implementation of research program;
  - Anticipated and unanticipated challenges (and some solutions)

Context: Pisco Valley, Peru

- 25,000 irrigated hectares
- Dominates by small-holder cotton farmers
  - 3,500 cotton growers
  - 13,000 hectares in cotton
- Principal yield risks
  - Drought
  - Excess rain (el niño years)
  - Temperature and pests
- High variability in average yields

Pisco Valley

First Step: Choose the Index

- Rainfall?
  - No: There's essentially no rain on Peru's coast
  - Would be insuring low frequency (1 in 13 year) catastrophic event.
  - Hard to start a market with such low frequency payouts.
- Volume of water in river?
  - Hmmm…sounds like a good idea…
  - Surface water in Pisco comes from rainfall & glacial lakes in highlands.
  - Variability in upstream conditions → variability in valley floor yields.
  - Exists 25 years of volumetric river flow measurements on valley floor
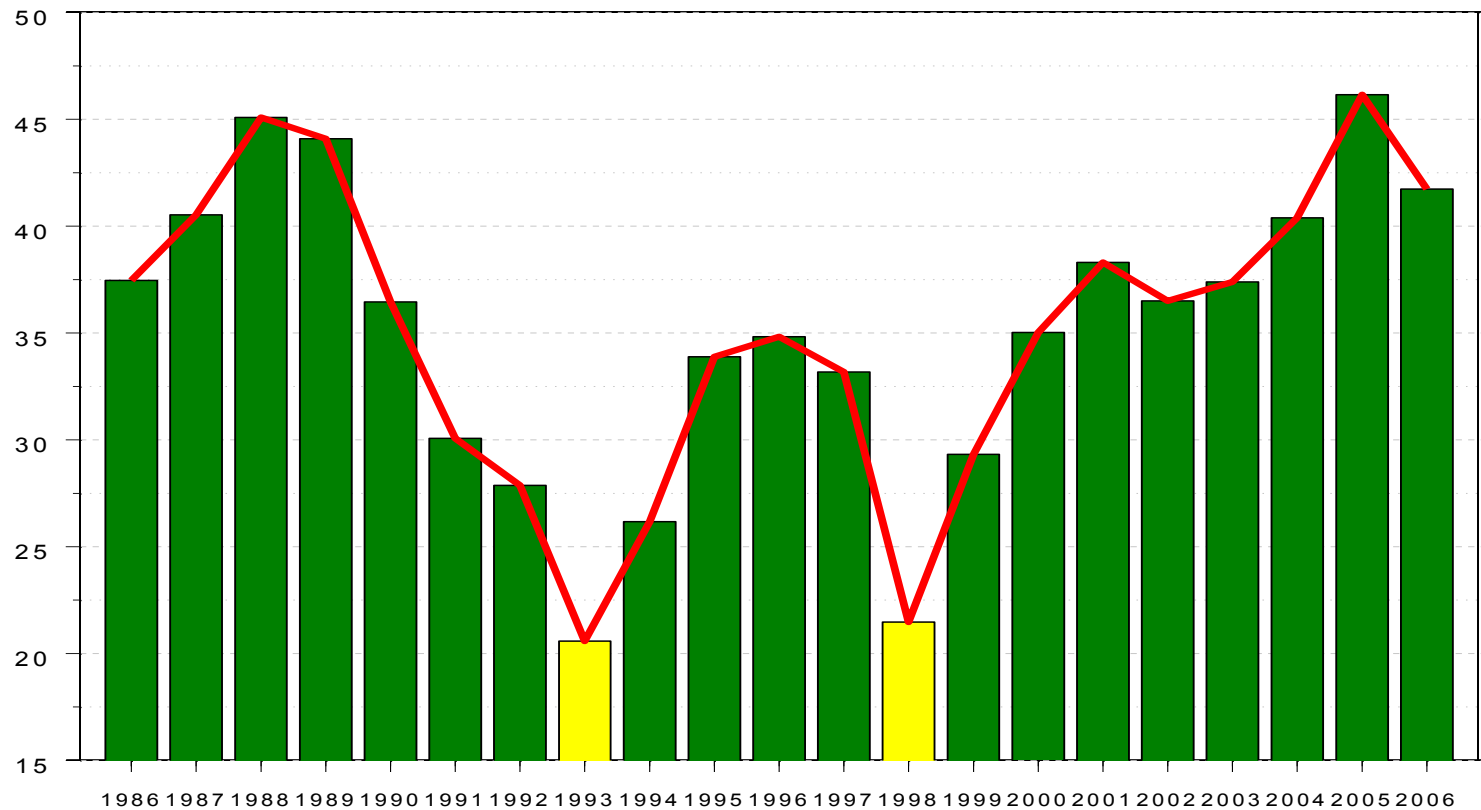 - But correlation between water availability and yields is quite low
  - Why???

- The quality of the data is very low;
- River flows weren't even measured in el Niño years.

- So, we instead decided to use…

Average Valley Yields

Rendimientos de algodon en la provincia de Pisco: 1986-2007
(Quintales por hectarea)

Index Measurement

- How do we measure yields?

- Self-reported yield from random sample of cotton plots throughout the valley.

- Logistics

  - Cotton harvest occurs early May – mid June.

  - 380 plots surveyed between June 15 – June 20

  - Area Yield estimate publicly released on July 1.

  - Indemnities paid by July 15.

Concerns with Area Yield Measure

- Fixed Cost of Survey
  - $3,000 to run survey and generate yield estimate.
  - For first 4 years cost assumed by researchers.
  - Not prohibitive IF sufficient number of policies sold.
- Moral Hazard in Reporting
  - Won't farmers intentionally under-report yields to trigger payouts?
  - Perhaps…but not too concerned yet
    - Insured farmers are small portion of surveyed plots (uninsured have no incentive to under-report)
  - As market advances, will need to work more on this
    - Verify with sales receipts from govt. program
- Farmer Trust in Yield Measurement
  - Worked with Cotton Growers Association and insurer to design survey methodology and choose independent survey firm.

Second Step: Contract Design

- Index is average valley yield;
- Data from 25 years of annual cotton yield figures for the Province of Pisco (coincides with the valley)
  - Initial concern with quality of data...MinAg used "key informant" methodology.
  - Corroborated
    - From 2002 – 2005, MinAg ran pilot program of rigorous, survey based yield measurements;
    - Comparison of "key informant" method with survey-based method showed slight over-estimation of yields using "key informant" method.
    - Adjusted earlier data accordingly.
- With 25 years of data, we estimated pdf of area yields for Pisco.
- With pdf, could calculate actuarially fair premium for any contract.
- ...now we just needed somebody to sell it.

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  - 18 months of meetings with APESEG (umbrella organization)
  - Finally found an innovative manager, willing to experiment with the ag sector from the insurance company "La Positiva"

- Problem: Lack of trust by farmers
  - Since La Positiva has no history in agriculture, how do we establish trust?
  - Trusty Marjorie and Oxfam weren't available…
  - Insurance sold through local MFI/Bank
  - La Caja Rural Señor de Lúren has a long and respected history of offering financial services (including loans) to small holders throughout Pisco.

Final Institutional & Contract Structure

- Triangular Institutional Structure
  - Insurance registered and provided by: La Positiva
  - Insurance sold by: Caja Rural Señor de Luren
  - Re-insurance provided by: HanoverRe
- Contract
  - Strike point = 31 quintales (3,100 lbs)/hectare
  - 85% of expected area yield
  - Premium = $47/hectare (3 – 5% of production costs)
    - Actuarially fair premium = $35
    - Plus Loading = $32
    - Minus Government subsidy = $20
- Insurance offered by itself or linked with credit
- Borrowers who buy insurance receive interest rate discount (3.25% en vez de 3.5%).

Research Design

- Insurance introduced in August 2008 (cotton cycle is september – May).

- All cotton growers in the valley are eligible to buy insurance.

- 800 cotton growers randomly selected for surveys.

- Followed for 4 years;
  - Baseline: Agaust 2008 (recall for 07-08 year)
  - Follow-up surveys in: 2009, 2010, 2011

- Primary questions: What is the impact of insurance on:
  - Credit rationing and participation in credit market;
  - Intensiveness of input use, investment and cotton productivity;
  - Income and consumption;
  - Wealth.

How do we create Counterfactual?

- Insurance company and lender not willing to to create conventional "control" group by denying access to a randomly chosen group of cotton farmers in Pisco.

- Difficult to use control group in a nearby valley without insurance because conditions are very different.

- Were willing to use "Encouragement Design"

- Randomly distribute two instruments that:
  - Affect farmers' probability of purchasing insurance;
  - No direct effect on outcome variable;

- Instruments
  - Coupons: Random variation in price of insurance;
  - Information/game sessions: Random variation in exposure to information about the insurance.

First Instrument

□ Coupons

▫ Randomly distributed coupons to 540 cotton growers:

▫ Could only be used if the farmer purchased insurance.

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□ Coupons

  ▪ We randomly distributed coupons to 540 cotton growers.

  ▪ 4 values: $5, $12, $22, $30 per insured hectare

  ▪ Premium = $47 per hectare

    ▪ Actuarially fair premium (no "loading") = $35

    ▪ $12 coupon → access to actuarially fair insurance

  ▪ We expect (at least in theory) high participation rates for those who receive coupons for $12, $22 y $30.

  ▪ The $22 and $30 coupons actually *increase* expected income.

Second Instrument

- Information/Game Sessions
  - Two objectives
    - Educate farmers so that they make informed demand decisions.
    - Second instrument to help in econometric identification of impacts.
  - Logistics
    - Invitations to "information sessions" distributed to 600 randomly selected farmers.
    - Ran 16 sessions in 16/40 irrigation districts in the valley.
    - First part (90 min.): Farmers played experimental economics games that teach how the contract works (focus on basis risk).

Covariate Risk Bag

Black chip → Disaster in the valley!!

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    - Second part (30 min.): Short presentation about the real contract, short marketing video from La Positiva, Q&A session.

Everything was ready to go…

- Impact evaluation well thought out and put in place;

- Institutions ready and enthusiastic (Insurer, Lender, Re-insurer);

- Contract formally registered in the Superintendency;

- Product launched on time in August 2008;

- And…

- …Nobody bought it!
  - 2008: 52 policies, 148 hectares

- Made some adjustments to policy and procedures…
  - 2009: 120 policies, 314 hectares

- Why such low takeup? Some hypotheses…

Overlooked key incentive problem with the lender

- Manager of Pisco branch of bank did not fully support the product.
  - Our primary negotiations were with Board of Directors.
  - Board gave vertical order to Pisco manager to implement to insurance.
  - But costs born by Pisco branch;
    - Training of loan agents;
    - Reduction in interest rate reduced (in short run) branch revenues.
- Result:
  - Manager communicated his frustration to the credit agents.
  - Agents – the real face of the product – were very passive in promoting the insurance.

Games & Information Sessions not as Effective as we Hoped?

- Less effective in communicating basic contract structure
  - ~ 25% still thought indemnity depended on individual yields instead of average valley yield (exit survey).
  - Farmers in more productive parts of valley undervalued insurance.
    - Since their yields were very unlikely to fall below strikepoint, they thought that insurance had no value for them.
    - Did not understand that the value of the insurance depends on the degree of *co-movement* between individual and valley (which is high).
- Fundamentally different notion of *average*
  - For us, average yield (*rendimiento promedio*) = statistical mean;
  - For farmers *rendimiento promedio* = potential of their farm (what it should produce in a good year).
  - Result: Farmers under-value the insurance.

Not a Coupon Culture?

- Farmer with largest coupon essentially gets the insurance for free if they take a loan (interest rate discount = premium).
- Why didn't they insure?
- Perhaps they don't understand how the coupon works.
  - In February we will interview all large coupon recipients who did not buy insurance to understand why.

Uncertainty From Public Policy

- Alain's point yesterday: Farmers' expectation of public intervention may impede market development.

- During presidential campaign, García pomised that he would provide agricultural insurance;

- Has yet to implement any program but…

- Farmers may prefer not to buy private insurance if there is a possibility that the government will offer a highly subsidies (perhaps even free) insurance program.

Macro Shocks

- 2008: Oil shock
  - Fertilizer prices spiked in august/september 2008
  - Precisely when farmers taking planting decisions
  - Cotton highly dependent on chemical fertilizers
- New trade policy reduced protection for cotton farmers
  - Large increase in textile imports from India;
  - Cotton prices fell 33%
- Implications
  - Farmers focused more on price risk instead of yield risk;
  - Profitability dropped
  - Many farmers switched out of cotton
    - In our sample, 40% did NOT plant cotton last year.
- Chose wrong crop at the wrong time to carry out impact evaluation?

Final Thoughts

- Is the insurance cup half empty or half full?
  - Half Empty: Frustrating Low Takeup
    - Covariate yield risk is a real issue in Pisco
    - 25% of cotton farmers risk rationed
    - Yet farmers reluctant to purchase insurance
    - Many hypotheses about low takeup…much more work needed to separate among them (Xavi's work promising).
  - Half Full:
    - Encouraged that private actors (insurer, bank) willing to participate and market was created.
    - Perhaps just need more time and adjustments?

Final Thoughts

- Sharing experiences is crucial
  - Creating insurance markets is hard work;
  - Many details (i.e., marketing) in which academics do not have comparative advantage.
  - Private/NGO/Academic collaboration critical.
  - Need to share experiences…including failures…to move forward.
  - Innovative research designs also critical
  - Need to coordinate and accumulate collection of evidence across research projects to move the insurance initiative forward.

Thank you for your time!