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, Peru
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 algodón en la provincia de Pisco: 1986-2007
(Quintales por hectárea)
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.
Third Step: Find Institutions to Market and Sell the Insurance

- Insurance Company
  - Many exist in Peru, but none have worked in agriculture
  - 18 months of meetings with APESEG (umbrella organization)
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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%).
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: August 2008 (recall for 07-08 year)

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 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.
First Instrument

- **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 $\rightarrow$ 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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    - 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).
    - 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…
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 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.
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.
Alain’s point yesterday: Farmers’ expectation of public intervention may impede market development.

During presidential campaign, García promised 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.
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?
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!