

Tailoring Contract Farming to Smallholders: Experimental Evidence on Enrollment Impact, Insurance Provision and Communication Technologies

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Basis Technical Meeting

Sep 13, 2013

Agricultural transformation: shift to more complex organizational forms

SSA: growth of contract farming

- Commitment to sell/purchase
- Buyer provides inputs on credit

Opportunities for research

- Administrative data (long panels)
- Partnership with large companies for experiments
 - Synergies with organizational economics

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1. Impact of linking farmers to contract farming schemes

- RCT of linking farmers to CF scheme
- Armah et al, (2010), Barrett et al. (2012), Reardon et al. (2003, 2009)

2. Complementarity between CF and other “markets”

- *Insurance*: Design and payment
- *Information*: Communication frictions along supply chain

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Sugarcane Contract Farming in Kenya

Partnership with large sugar company in Western Kenya

- Sector established in the Seventies
- Most important commercial crop in the region
 - Most farmers grow maize for consumption
- Government owned, then privatized
- Small nucleus estate + large outgrowing scheme
 - Outgrowers harvest cycles are staggered (18-month cycle)

Sugarcane Contract Farming in Kenya (cont'd)

- Around 130,000 contracted cane plots
 - Most plots <1ha
 - Contract: 1 plant and 2+ ratoons
- Price regulation (Kenya Sugar Board)
 - Farmer's price based on harvest price
- Company provides inputs on credit
 - Seedcane, fertilizer, harvesting, transport
 - Independent contractors provide inputs to cane suppliers
- Outgrower tasks: weeding, fertilizer application

Administrative plot-level data

“Insider Econometrics”: access to all the company data

- Name of contracting farmer
- Geographical information on the plot
- Cane age and variety
- Company inputs delivery dates and charges
- Plot size, output, and net revenues

Research Collaboration

Ongoing

- Productivity dynamics (digitized old administrative data)
- Conditional cash advances to cane suppliers
- Communication technology, farmers' and firm productivity

Planned

- Randomizing new farmers joining the scheme
- Outgrowers' agricultural insurance

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Agricultural Insurance for Outgrowers

Understanding drivers of insurance take-up still a priority

- Cole et al. (2008), Karlan et al. (2012), Carter (2012)

Risks for cane farmers

- Rainfall
- Cane fires
- Delayed input delivery

Nesting insurance in CF could help along two dimensions

- Intertemporal choice
- Basis risk

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Insurance as intertemporal decision

Insurance as intertemporal choice: premium t_0 , indemnity t_1

- Impatience
- Liquidity constraints
- Loss aversion

Intervention: insurance premia as deduction (400 farmers)

- T: insurance offered on credit
 - *Good state*: premium deduction at harvest (+ i)
 - *Bad state*: indemnity paid at harvest (subtracting premium+ i)
- C: insurance premium paid at t_0
 - Related work: Ahmed et. al (ongoing), Carter et al. (2010)

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Outcome: take-up rate

- Selection?

Possible Extension: Insurance and “CF Take-up”

- Are farmers more likely to enter CF if offered insurance?

External validity: theory

- Disentangle impatience, liquidity constraints, loss aversion
 - Baseline survey: discount rates, liquidity constraints
 - Intervention twists (?)

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Contract Farming and Basis Risk

Basis risk reduces demand for insurance

- Clarke (2011), Mobarak and Rosenzweig (2012), Elabed et al. (2013)

Source of basis risk in rainfall insurance

- Other risks besides rainfall
- Measurement error in rainfall
 - Distance station-plot
 - Specificity of rainfall moments used for index

CF scheme has rich plot-level yield data ⇒ Area Yield Insurance

- Miranda (1991), Carter (2007, 2012)
- India National Agricultural Insurance Scheme (25 million people)

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Area Yield Insurance

Sample Size: 3,000 farmers (co-funding)

Step 1: Randomize insurance type (area size)

- Own-plot vs. "field" vs. "sublocation" vs. control
 - Basis Risk ↘ when AS/MH ↗

Step 2: Offer insurance with lower basis risk to random subset

- Disentangle AS vs. MH in different insurance products
 - Karlan and Zinman (2009), Gunnsteinsson (2013)

Outcomes: what's the optimal area size in this trade-off?

- Take-up
- Farmer inputs, agricultural profits, default

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Insurance Experiments: Next Steps

- Use rich admin data to perform actuarial calculations
 - Actuarial calculations consultant
- Finalize insurance product(s) design
 - Area size options
 - How to make products “comparable”?
 - Area yield insurance or “area net-revenue” insurance?
- Determine insurance provider
 - Company vs. third-party provider
- Scalability (*superstition aside...*)
 - Company support; scalability potential to 140K farmers
 - Review of CF in East Africa to identify potential partners

Randomizing Outgrower Recruitment

- Company expanding (new zones, new farmers in old zones)
- Company agreed to randomize recruitment (one-cycle)
 - CF includes “new crop”
 - Randomize among farmers expressing interest (2,000 total)
 - Policy relevant LATE
- Extension (?): purchase-commitment vs. input-supply
 - Feasibility yet to be confirmed

Randomizing Recruitment: Outcomes

Outcomes

- Agricultural and non-agricultural Income
- Agricultural technology adoption
 - Spillover to other crops?
- Food security
 - Cash crop vs. subsistence crops debate
 - Gugerty and Schneider (2010)
- Contract enforcement (if able to experiment multiple models)

Heterogeneity in impact of joining CF

- Farmer wealth and total land cultivated
- Farmer gender
- Cane plot ownership/tenancy status.

Randomizing Recruitment: Next Steps

- Identifying target zones among catchment area
- Randomization unit (plot vs. field)
- Power calcs: pilot survey in next 2 months
- Synergies with insurance project?

Communication along the Supply Chain

(some work also joint with Sendhil Mullainathan)

- Low ratio of extension agents to cane suppliers
 - Around 100 field assistants
- Long distance between plots and company field offices
- Delays in input deliveries to cane suppliers
 - Independent contractors

Can ICT reduce communication frictions along the value chain?

ICT and Supply Chains: Preliminary Results

Two Interventions (RCTs):

1. Farmer Hotline

- Farmers report queries on company performance
 - Input delivery delays, payment delays
- Likelihood fertilizer arrives in time up by 13% (control mean 57%)

2. Personalized SMSs sent to farmers

- Reminders+Information (based on cane age and cycle)
- When to weed, trashline, apply fertilizer
- Increase in outgrower plot yields: 7%

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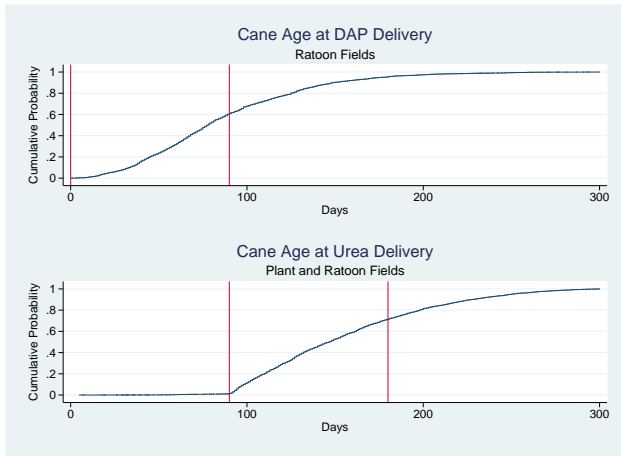
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Baseline Fertilizer Deliveries



Farmer Hotline: Preliminary Results

	Urea Delivered			Ln(Age) Urea Delivered			Urea within 6 months		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Hotline	0.039 [0.024]	0.046** [0.023]	0.031 [0.027]	-0.055** [0.027]	-0.047* [0.027]	-0.062** [0.031]	0.074** [0.033]	0.089*** [0.033]	0.061* [0.037]
Sample	All	Participants	Non-Part.	All	Participants	Non-Part.	All	Participants	Non-Part.
Mean Y Control	0.775	0.772	0.778	5.047	5.058	5.037	0.569	0.550	0.587
Observations	8414	4041	4373	6592	3187	3405	7292	3494	3798

Outgrowers SMS: Preliminary Results

	Yields		Yields Winsorized		Log Yields	
	(1)	(2)	(3)	(4)	(5)	(6)
ITT_cell	4.218** [1.941]	3.348** [1.482]	3.116* [1.648]	3.105** [1.407]	0.070 [0.046]	0.074* [0.039]
Controls		X		X		X
Mean Y Control	41.645	41.645	41.421	41.421		
Observations	1845	1845	1845	1845	1845	1845

Capacity Building in Kenya

- Peer research collaboration
- Faculty and Ph.D. students training
- Ph.D. students research funding
- Partner company staff research funding
- Master degree scholarships

Thanks