

Building Market Linkages for Smallholder Farmers in Uganda

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Poor Integration in African Markets:

Lack of market integration is a major issue.

- Leads to highly variable prices across time, so farmers tend to sell low (harvest) and buy high (hungry season) (Burke 2013).
- Leads to high search costs (Allen 2013) and poor cointegration across space (Minten, Stifel, and Tamru 2012).
- Improving intermediation allows for the possibility of large returns in the gains from trade (Antras & Costinot, 2011).
- Major implications for farmer welfare, food security (Badiane and Shively, 1998, Ravallion 1986).
- Downward-sloping demand curves dampen incentives to invest in productivity enhancement, may also have major long-run effects on agricultural productivity in shallow markets.

Poor Integration in African Markets:

Some very expensive ways to solve this problem:

- Infrastructure investment:
 - roads (Minten 2011, Casaburi et al. 2013)
 - storage capacity (Deaton & Laroque 1996)
- Information Technology appears to be a cost-effective alternative, but:
 - Simply providing price information to farmers isn't sufficient in most contexts (Fafchamps & Minten 2012, Mitra et al. 2013), despite Jensen (2007) and Aker & Fafchamps (2010).
 - Necessary to fundamentally shift intermediary power/actors in order to change prices (Goyal 2011, Aker 2010, Svensson & Yanagizawa 2009).

Poor Integration in African Markets:

- Hypotheses: what is required to change intermediary market power, improve farm-gate prices:
 - 1. Farmers must be informed at the time they make sales decisions.
 - 2. Farmers must have multiple, competing buyers.
 - 3. Buyers must overcome search cost, obstacles related to price and quality uncertainty in order to be willing to trade deep in rural areas.
 - 4. Long output sales chains need to be shortened. Need to cut out multiple intermediaries all of whom can extract information rents.

Our solution:

- Multipronged intervention providing:
 - Creation of new private-sector intermediaries with direct links to large buyers, including forward contracts for specific cash crops.
 - Implementation of Kudu, new digital trading platform for agricultural crops, allows farmers or agents to post lots, reservation prices.
 - Use of quality/bulking certification by agents and randomized transport cost guarantees to promote digital platform.
 - Creation of large-scale SMS-based Market Survey in 260 markets, collecting price data every two weeks.
 - Creation of 'SMS Blast' system that broadcasts price data from Kudu
 + Market Survey out to traders and farmers in treatment markets.
 - Large-scale RCT covering 12% of Uganda.

Our Team:

 Policy Design & Evaluation Lab at UCSD.



- AgriNet: largest privatesector ag intermediary.
- Kudu: new software platform from Makerere



Kudu trade Welcome to Kudu! Buy and sell agricultural goods in tauction system. How to buy » How to sell » About us » Create Account

IPA Uganda

AgriNet

- Largest private-sector agricultural intermediary in Uganda.
- Recruit and train 'Commission Agents', who:
 - bulk and sell output using AN and own capital,
 - receive 'trader alerts' about district & national prices and post on community whiteboard.
 - engage in forward contracting, provision of inputs for specific crops (sorghum) for specific buyers (Uganda Breweries).

Kudu.

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- Designed by the College of Computing and Informatics Technology at Makerere University.
- Registered sellers post lots for sale, state reservation prices, system knows seller location.
- Buyers post bids and a ceiling price, matching algorithm finds distance/price pareto frontier and displays 3 best lots to each seller.
- Price-setting mechanism gives buyer lowest price possible.
- Kudu advertises by radio in sales markets.



AgriNet-enhanced Kudu.

- CAs will 'certify' the quality and bulking of lots posted on Kudu.
- Creation of an enhanced Kudu interface that allows for posting of quality, AN certifications, guarantees.
- Project will provide transport cost guarantees to randomly selected lots to understand how contractual risk may prevent this market from working.

SMS Market Survey System.

- Recruit traders to serve as enumerators; every two weeks they are pushed out a survey and they respond by SMS.
- Open-source software being designed at UCSD.
- Training, spot-checking to be conducted by IPA.
- New way of providing high-granularity market data, system designed to be scaled rapidly within SSA if successful.
- Provides data capture for study as well as price inputs for interventions in treatment markets.

Market Linkages:

Basic Schematic: Farmers sell to traders in local market trading centers.

Local traders sell on to regional middlemen who transport to large national, international markets.



Market Linkages:

Kudu: Provides direct linkage between farmers and national buyers.

Our project trains & licences AgriNet CAs to certify the quality of lots posted in Kudu.

AN to provide liquidity for bulking.

Randomized guarantees of transport costs for buyers.



Market Linkages: TREATMENT: CONTROL: Farmers: F F Market survey F captures prices in T & C markets Local Markets: biweekly. Т KUDU SMS Blast System т Т Price data from Trading platform Т т Market Survey, MARKET SURVEY Kudu fed into Blast SMS system. Regional Markets: Farmers and Traders sign up to receive Blast SMS, system free National Market: for first year of National project. Buyers



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Research Design & Statistical Power:



Randomization conducted at sub-county level.

- Pick 2-3 largest trading centers in each subcounty; become PSUs.
- > Statistical power is an issue despite very large geographic coverage.

PRODUCTION AND MARKET FLOW MAPS: UGANDA MAIZE SECOND SEASON







are:

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- maize surplus
- relatively remote
 - deemed by Agrinet to be attractive commercial candidates for expansion.

Project Timeline:

- Market identification study currently underway.
- Trader and Household Baselines Jan-Mar 2015.
- Market Survey starts in Mar 2015.
- Interventions begin with harvests in June 2015.
- Endlines in Spring 2017.

Years	2014							2015													2016								2017										
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Compiling list of sub-counties																																							
Randomization																																							
Design Survey Instruments																																							
Recruitment Interns																																							
Market Identification																																							
Market Selection																																							
Pre-test Survey Instruments																																							
Programming surveys on tablets + testing																																							
Recruitment of Enumerators																																							
Preparation training & field work																																							
Training baseline survey																																							
Household Survey team + recruitment farmers for KUDU																																							
Trader Survey team + recruitment traders for KUDU																																							
Trader recruitment for SMS market survey + training team																																							
CA Recruitment																																							
CA/Kudu Training																																							
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Impact Evaluation Workshop for East African PIs																																							
Clean and analyse data								П			П			П																									
Roadshow (outreach) to USAID missions																																							
Draft report and academic papers				Π						Π	Π	Π																							\Box	П			

Primary outcomes:

Market level:

- price levels, price dispersion, buying/selling margins.
- intertemporal price variation.
- responsiveness of prices to weather-driven output shocks.

Trader level:

- profits & degree of market competition.
- trading volumes, trading locations, crops.
- what info held, where acquired.

Farmer level:

- farmgate prices.
- marketed surplus, crop choice, inputs, who sold to.
- what info held, where acquired.

Analysis of market outcomes:

Dyadic analysis, ignoring 'hub and spoke':

$$\rho_{ij} = \beta_0 + \beta_1 1_{ij} + \beta_2 2_{ij} + \delta_0 d_{ij} + \delta_1 (d_{ij} * 1_{ij}) + \delta_2 (d_{ij} * 2_{ij}) + \varepsilon_{ij}.$$

- This will recover the following parameters:
- $\triangleright \beta_1$: Impact of having one dyad treated but not both, at zero distance.
- β_2 : Impact of having both in dyad treated, zero distance.
- ▶ δ_0 : Effect of distance on price dispersion in control, +underlying spatial correlation.
- ▶ δ₁ : Partially a TE from one pair being treated, also contains a spillover coming from traders being able to forecast prices better even in control markets.
- δ_2 : impact of improved information between dyads

Analysis of market outcomes:

• Using 'hub and spoke' to parameterize spillovers: $\rho_{ih} = \beta_0 + \beta_1 T_{ih} + \beta_2 T_h + \beta_3 (T_h * T_{ih})$

 $+ \delta_0 d_{ih} + \gamma_0 d_h + \delta_1 (T_{ih} * d_{ih}) + \delta_2 (T_h * d_h) + \delta_3 (T_h * T_{ih} * d_{ih}) + \varepsilon_{ih}$

- This will recover the following parameters:
- β_1, δ_1 give the impact of having a spoke market treated.
- ▶ β_2, δ_2 give the spillover effect of having a hub treated conditional on the spoke not being treated.
- β₃, δ₃ give the additional treatment + spillover
 effect of treating a spoke if the hub is also treated.

Handling Spillovers:

- Would like to have 'pure control' districts, don't have the power for this.
- Might also like to use 'randomized saturation' design (Crepon et al. 2013, Baird et al. 2014) to look at spillovers directly, don't have power.
- How to balance desire for balance across districts (blocking) with the need to measure spillovers?
 - 'Hub and spoke' designation as a way of pre-committing to spillover structure: for each spoke market we identify the 1 or 2 major hubs and consider the treatment status of the hub as well as of the spoke.
 - Block by hub & spoke, stratify by baseline prices, but don't block by district so as to create accidental variation in treatment at district, spatial level.
 - Identify 20 markets that are outside of the study area to serve as pure controls (non-experimental) and track them through the whole study using the Market Survey.
 - Other ideas?

Wrap-up:

Multipronged intervention that seeks to:

- improve knowledge of prices and potential buyers for farmers.
- deepen resources available for commercial intermediaries in local markets.
- develop new high-tech platforms for agricultural trade.
- Additional issues we hope to explore:
 - experiment with guarantees & use of liquidity in the AgriNet bulking process; is *capital* a barrier to arbitrage?
 - provide randomized fuel subsidies for truckers moving over specific routes to T & C markets: how do *information* and *transport costs* intersect to create Law of One Price?
 - secure support from USAID mission to help AN take over management of storage facilities in selected markets

Thank you!

