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Food security and value supply chain: the case of Ugandan maize

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Outline

- Aim
- Economics of maize in Uganda
- Contribution
- Data
- Identification strategy
- Results
- Conclusions

Research question

Does **farmer's participation** and **position** to **maize value supply chain (VC)** affect their **food security**?

- Participation and position $\rightarrow$ different market access, trade exposure, risk exposure etc.

Uganda is an ideal candidate:

- Food security is a priority for the country's development agenda (WFP, 2009).
- There is a panel data of households (2009-12) collected by the WB.
- Maize production more than doubled during 1990-2010. Consumption recently increased (FAO, 2012) and is the third main export crop (FAO, 2014).

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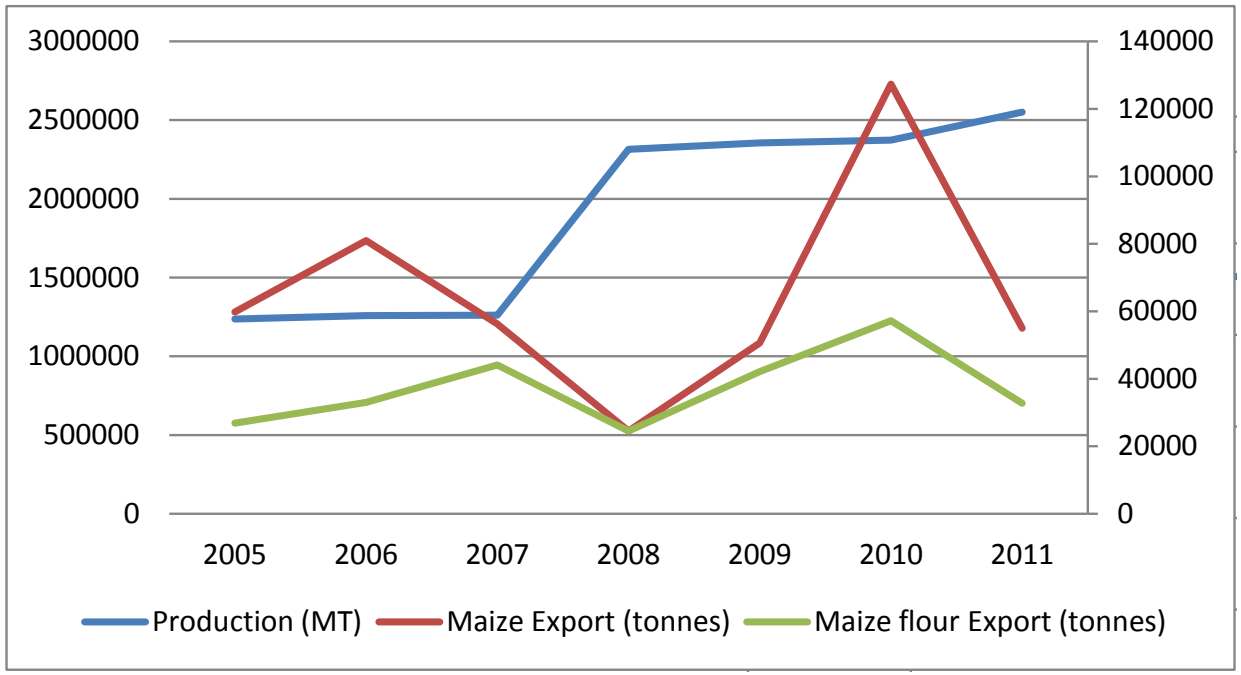
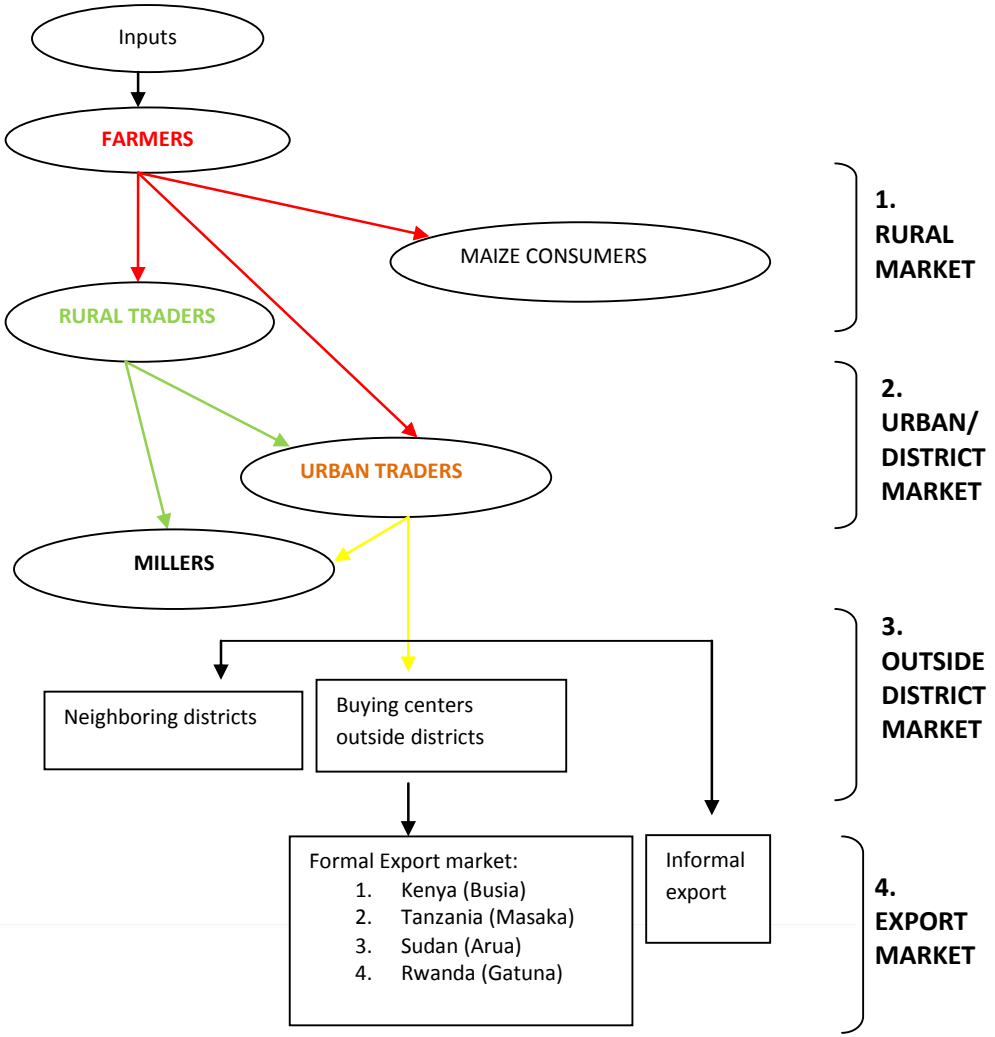
Figure: Maize production and formal export of Uganda (FAOSTAT, 2015)



Maize Value Chain & Key Players



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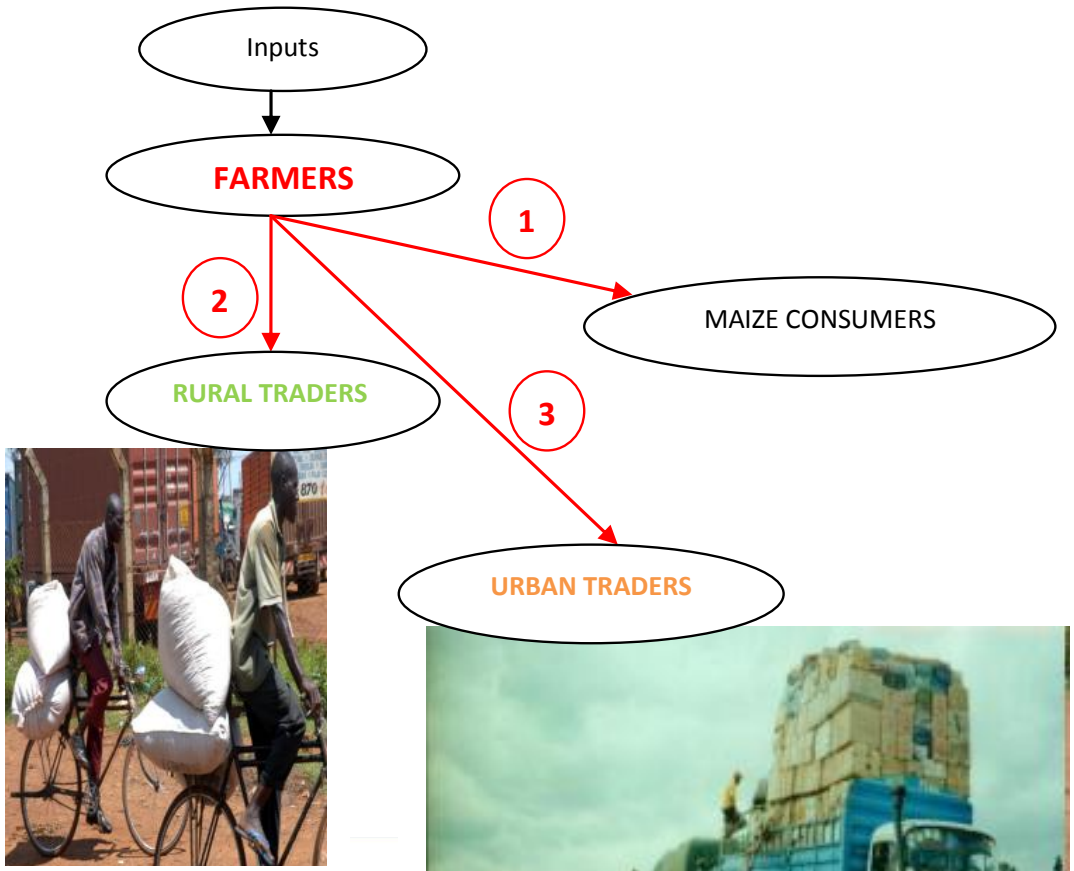
What do we do?

- We extend the analysis of the trade impact on poorest households (Niimi et al.,2007; Balat et al.,2009; Magrini and Montalbano, 2012) using household surveys to **trade and food security**.
- We look at maize in Uganda as **both export and food crop** by overcoming the approach of Balat et al. (2009) that compares export vs food crops.
- We focus on household **participation** (inside - outside) and **position** (downstream - upstream) to maize VC. Evidence (Fafchamps and Hill, 2005 and 2008) suggests that farmers receive a small fraction of final price explained by high transaction costs and market failures (monopsonic rents by assembly traders).

VC participation & position

- Our strategy: to investigate the effect on farmers' **food security** of:
  1. VC participation:
     - selling maize to local consumers (outside the VC)
     - selling maize to local/district trader (**inside the VC**)
  2. VC position:
     - selling maize to local consumers (out of chain)
     - selling maize to local trader (**upstream**)
     - selling maize to district trader (**downstream**).

VC participation & position (cont.)



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Uganda Living Standards Measurement Study - Integrated Survey on Agriculture (LSMS-ISA)

- The survey sample includes approximately 3,000 **Ugandan households** and is representative at national and regional level.
- The households are visited **three times** between 2009 and 2012.
- The main advantage of the survey is the presence of an extended **agricultural questionnaire**, which includes detailed informations on household farming practices.
  - The variables for use of inputs and production are replicated for 2 maize season - to control for seasonality in unimodal/bimodal regions;
  - Different combinations of crop conditions (wet or dry) and state (in shell, without shell, with stalk, without stalk, in cob/head) are converted into Kg.

Descriptive analysis

Table: VC participation and position in Uganda LSMS-ISA pooled sample 2009/12

	N. of HHs	
Tot. households	8,541	
Farmers producing maize	4,695	
Net-producer of maize, selling:	**1,832**	
only to local consumers	325	**Outside the VC: 325**
only to local t.	1,131	**Upstream: 1,262**
to local consumers *and* local t.	131	
only to district t.	128	**Downstream: 245**
to local consumers *and* district t.	38	
to local t. *and* district t.	73	
to local consumers *and* t. *and* district t.	6	

Descriptive analysis (cont.)

Table: Mean values of **HH food security** by VC participation & position

	Outside the VC	**Upstream**	**Downstream**
(log) Food cons pc	12.376	12.380	12.454
	(0.779)	(0.733)	(0.609)
N.meals per day	2.514	2.537	2.519
	(0.603)	(0.585)	(0.586)
HDDS	6.648	6.814	7.217
	(2.263)	(2.063)	(1.853)
Sq. mean diff. of (log) food cons	0.173	0.163	0.136
	(0.616)	(0.412)	(0.297)

Standard deviation in parenthesis.

Descriptive analysis (cont.)

Table: Mean values of **maize production and sale** by VC participation & position

	Outside the VC	**Upstream**	**Downstream**
Use of pesticides	0.037	0.116	0.174
	(0.189)	(0.321)	(0.380)
Use of improved seeds	0.138	0.188	0.260
	(0.346)	(0.391)	(0.440)
Hire labor	0.369	0.461	0.545
	(0.483)	(0.499)	(0.499)
Sold maize (Kg)	1,043.129	1,751.885	2,316.673
	(2,787.349)	(3,129.768)	(3,795.620)
Transport cost (UShs)	886.259	2,691.153	6,840.120
	(7,543.133)	(31,089.450)	(26,104.640)
Unit price (UShs per Kg)	764.595	803.293	1,125.877
	(2,847.338)	(2,894.757)	(3,134.366)

Standard deviation in parenthesis.

Identification strategy

We employ the following models for households net-producer of maize:

$$FS_{h,t} = \alpha_h + \gamma_t + \alpha_h * t + \phi_1 In_{h,t} + +\delta X_{h,t} + \epsilon_{h,t} \quad (1)$$

$$FS_{h,t} = \alpha_h + \gamma_t + \alpha_h * t + \phi_1 Out_{h,t} + \phi_2 Up_{h,t} + \phi_3 Down_{h,t} + \delta X_{h,t} + \epsilon_{h,t} \quad (2)$$

1. *In* is a dummy for selling maize **inside the VC**;
2. *Out* is a dummy for selling maize *only* to local consumers (outside the VC);
3. *Up* is a dummy for selling maize to local traders (with an **upstream** position);
4. *Down* is a dummy for selling maize to district traders (with a **downstream** position, i.e., closer to the final market/exports);

$FS_{h,t}$ is measured by (log) HH food cons pc and its squared mean difference; $X_{h,t}$ is a vector of HH controls; α_h and γ_t controls for HH and year fixed effects; $\alpha_h * t$ allows for HH-specific time-trend.

Identification strategy (cont.)

To test the presence of heterogeneity in food security according to household supply chain participation we control for:

- observable household characteristics changing with time;
- heterogeneity time invariant (ex. ability) - exploiting the panel dimension.
- linear time-varying heterogeneity (ex. experience) - using a household specific time-trend.

$\rightarrow$ If we reject H(0): $\phi_1 = 0 \rightarrow$ participation affects household FS.
$\rightarrow$ If we reject H(0): $\phi_3 - \phi_2 = 0 \rightarrow$ position affects household FS.

Results

Table: Panel estimates on (log) food consumption pc

	Dummies		**Shares** (Kg/tot sale)	
	Participation	**Position**	**Participation**	**Position**
	(1)	(2)	(3)	(4)
Inside VC	0.234*		0.350***	
	(0.129)		(0.130)	
Upstream		0.244*		0.359***
		(0.130)		(0.133)
Downstream		0.179		0.315*
		(0.166)		(0.175)
Obs.	1,654	1,654	1,654	1,654
R-squared	0.963	0.963	0.964	0.964

Results (cont.)

Table: Panel estimates on sq. mean difference of (log) food consumption pc

	Dummies		**Shares** (Kg/tot sale)	
	Participation	**Position**	**Participation**	**Position**
	(1)	(2)	(3)	(4)
Inside VC	-0.168*		-0.269***	
	(0.0876)		(0.0876)	
Upstream		-0.164*		-0.262***
		(0.0887)		(0.0902)
Downstream		-0.190*		-0.296**
		(0.113)		(0.118)
Obs.	1,654	1,654	1,654	1,654
R-squared	0.947	0.947	0.949	0.949

Results (cont.)

Does **self-selection** bias the results of panel models?

Table: Probit of participating to VC on maize characteristics

	Selling maize inside VC		
	2009	2010	2011
Pesticides	0.432	0.546	0.154
	(0.314)	(0.340)	(0.308)
Hire labour	0.0307	0.613***	-0.0839
	(0.139)	(0.139)	(0.153)
Improved seeds	0.0144	0.440*	-0.0314
	(0.161)	(0.231)	(0.213)
Harvested maize (Kg)	1.34e-05	1.26e-05	0.000233***
	(1.58e-05)	(1.82e-05)	(5.37e-05)
Maize acreage	-0.0555	-0.0589	-0.0476
	(0.0697)	(0.108)	(0.0812)
Unit price (UShs/Kg)	-4.12e-05	-2.06e-05	0.000185*
	(3.26e-05)	(2.10e-05)	(0.000101)

Conclusions

- VC **participation** affects HH food cons and exposition to shocks;
- Selling inside the VC matters rather than **position**:
  - High number of competitive traders per village may lower the margins between farm-gate and district prices (Sitko and Jayne, 2014).
  - In the considered period, the gains from selling to district trader may be negatively affected by external factors, as the drop of maize export in 2010 (since district market is export-oriented).
  - The panel specification identifies the coefficients though the movers. Selling downstream at t-1 and upstream at t can be a strategy to deal with year-specific effects (pb of selling downstream at $t-1$ and not at t is positively associated with year 2010).

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Thank you

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References

- Balat J., Brambilla I. and Porto, G., 2009. "Realizing the gains from trade: export crops, marketing costs and poverty", Journal of International Economics 78, 21-31.
- Independent Consulting Group, 2003. "Analysis of the maize supply chain in Uganda", November 2003.
- MAFAP-FAO, 2012. "Analysis of incentives and disincentives for maize in Uganda", December 2009.
- Niimi Y., Vasuveda-Dutta, P. and Winters L.A., 2007. "Trade liberalization and poverty dynamics in Vietnam", Journal of Economic Integration 22(4), 819-851.
- Magrini E. and Montalbano P., 2012. "Trade openness and vulnerability to poverty: Vietnam in the long-run (1992-2008)", University of Sussex WP N.35-2012.
- USAID, 2010. "Market assessment and baseline study of staple foods", Country report Uganda, March 2010.
- WFP, 2009. "Comprehensive Food security and vulnerability analysis", Country report Uganda, April 2009.