

# Smallholder Maize Marketing in Mozambique, Kenya and Zambia



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Duncan Boughton, David Mather and Thom Jayne



# Context: the challenge of rising food staple prices

- Rising food prices present an opportunity and a challenge:
  - Increased profitability of food production for farmers
  - Increased cost of living for consumers, many of who are poor
- Rapid urbanization *and* poverty reduction requires increase marketed food staple surpluses at lower cost: how?

# Options and trade-offs for meeting the high food staple price challenge

- Subsidize production and/or consumption

- Malawi fertilizer and seed subsidies

- Zambia FRA maize purchases

*rapid response (with good rainfall) but very costly, especially if private sector crowded out*

- Invest in farm productivity growth and improved marketing efficiency

*may take longer but more sustainable, especially if private sector encouraged*

# What kind of investments are needed?

- Marketed food staple surpluses depend on
  - Agro-ecological potential
  - Smallholder resources (land, labour, equipment, skills)
  - Access to improved technology
  - Access to markets (infrastructure) and price information
- Research question: what are the expected impacts of different kinds of investment on marketed maize surpluses in each country?

# Outline

- Data sources
- Descriptive analysis of marketing patterns
  - Share of smallholders selling/buying maize
  - Characteristics of smallholder sellers compared to buyers
- Regression results: marginal effects of increased resources on marketed surplus
- Implications for the design of Mozambique's public agricultural investment plans

# Data sources

## ■ Kenya

- 1256 households; 8 agro-ecological zones
- Tegemeo Institute, Egerton University

## ■ Mozambique

- TIA 2002 and 2005; 4908 households; 80 districts

## ■ Zambia

- PHS 2004 and 2008; 7400 households
- Central Statistical Office

Smallholder size: < 20 ha Mozambique and Zambia  
< 10 ha Kenya

# Characteristics of smallholder farming

<b>Smallholder household characteristic</b>	<b>Kenya (2007)</b>	<b>Zambia (2008)</b>	<b>Moz (2005)</b>
Median rural household income \$/AE	375	102	63
Tropical Livestock Units	4.2	2.4	1.0
Median area cultivated ha/AE	0.22	0.23	0.38
median % crop production marketed	46	14	8
Distance from village to fertilizer seller (km)	3	37	67
% HHs using chemical fertilizer on maize	71	37	4
% HHs using purchased hybrid/improved variety	70	41	2
% HHs using animal/mechanized traction	47	34	9.5
% HHs with irrigation	11	0.6	1
% HHs receiving extension visit in past year	58	53	15
% HHs with access to credit	52	9	3

# How many smallholders sell maize?

Maize market position	Mozambique		Zambia		Kenya	
	2002	2005	2004	2008	2004	2007
Autarkic (no buy or sell)	23.4	28.9	37.4	22.9	10.7	14
Buy only	55.5	52.3	34.4	47.2	45.2	39.9
Buy and Sell (net buyer)	5.5	4.3	2.7	3.0	5.7	2.9
Sell only	10.5	11.1	20.3	17.7	23.5	27.3
Sell and Buy (net seller)	5.1	3.4	5.2	9.2	14.9	15.9
TOTAL	100	100	100	100	100	100

# How much maize is produced and sold?

<b>Size of Net Seller</b>	<b>Output kg/AE</b>	<b>Mozambique</b>	<b>Zambia</b>	<b>Kenya</b>
<b>100 kg +</b>	<b>Production</b>	494	939	1046
	<b>Sales</b>	247	579	672
	<b>Share sold</b>	56%	58%	55%
<b>25 kg +</b>	<b>Production</b>	220	266	272
	<b>Sales</b>	51	72	68
	<b>Share sold</b>	35%	37%	28%

# What types of investment can meet the rising food price challenge?

- Increases in marketed surpluses by smallholder farmers can come in two ways:
  - Increase in number of farmers with a surplus to sell
  - Increase in size of surplus among sellers
- Panel regression analysis allows us to see the marginal effects of different investments on each

*Hypothesis: access to means of production (land, equipment, technology) more constraining than market access for Mozambican households*

# Finding #1: Agro-ecological factors

- Farmers in medium & high potential zones are 13% to 33% more likely to sell maize
  - Zambia: 1% increase in rainfall = 1.5% increase quantity sold
- Drought shocks decrease sales:
  - Mozambique: 11% decrease in quantity sold
  - Kenya: 7 to 21% decrease in probability of sale, 30% decrease in quantity sold

## Finding #2: Landholding

- Effects on probability of sale
  - Small but significant (Mozambique and Zambia)
- Large effects from a 1% increase in landholding on quantity sold (all HHs):
  - Mozambique 0.49% increase
  - Zambia 0.60% increase
  - Kenya 0.32% increase

# Finding #3: Hybrid Maize

## ■ Zambia

- 15% increase in probability of sale
  - Significant in medium & high potential zones
  - Farm-scale neutral
- 56% increase in quantity sold by sellers

## ■ Kenya

- 23% increase in quantity sold (among sellers)
- 35% increase in quantity sold (all HHs)

# Finding #4: Inorganic Fertilizer

## ■ Zambia: 1% increase in fertilizer

- 0.08% increase quantity sold by sellers
- 0.2% increase quantity sold overall
- Slightly higher probability of sale among HHs of all landholding quartiles

## ■ Kenya: 1% increase in fertilizer

- 0.13% increase quantity sold by sellers
- 0.19% increase quantity sold overall
- Farm scale-neutral in significance & magnitude of quantity effects

# Finding #5: Market Price Information

- Access to market price information (Mozambique)
  - 3.7% higher probability of sale
  - 27% higher quantity sold (all HHs)
- Radio ownership (Zambia)
  - 18% higher quantity sold (sellers)
  - 25% higher quantity sold (all HHs)
- Cell/landline phone ownership (Kenya)
  - 5.6% higher probability of sale
  - 23% higher quantity sold (sellers & all HHs)

## Finding #6: Market Access

- No significant effect of 'distance to road' (Moz, Zambia, Kenya)
  - Previous studies in SSA had found significant effects of 'market access variable' on grain sales (controlling separately for price)
  - Our result possibly due to increased presence of traders in rural areas, diffusion of cell phones, etc

# Finding #7: Expected Farmgate Maize Price

- No significant effect on probability of sale or quantity sold (Moz, Zambia)
  - Suggests that principal constraint to selling maize is inability to grow a surplus (i.e. need for assets, technology) OR
  - Supply elasticity is extremely low due to low input use
- Significant and large effects in Kenya
  - 1% price increase = 0.6% increase probability of sale
  - 1% price increase = 2.2% increase quantity sold

# Implications for Mozambique's agricultural investment program

- Access to land, equipment, improved technology, and market information can *all* contribute to increased marketed surplus



*Need an integrated approach adapted to agro-ecological potential*


# Investments for agro-ecological factors

- Reduce sensitivity of maize to low rainfall and drought
  - Widespread promotion of smallholder access to low-cost methods of irrigation and/or conservation farming techniques
  - Investment in development and dissemination of drought-tolerant maize varieties
    - Zambia/Kenya examples demonstrate that improved varieties are farm scale-neutral



# Investments to increase land access

- Increase landholding and productivity by promoting animal traction
  - Alleviate disease constraints to animal traction via medicinal subsidies and/or eradication of the tsetse fly in productive zones
  - Support rural financial services to address household constraints to financing traction rental
  - Increase livestock extension efforts to promote oxen ownership or rental in areas with little experience in oxen husbandry



# Investments to increase seed and fertilizer access

- Zambia/Kenya results demonstrate that improved seed and fertilizer use is farm scale-neutral
- Address constraints to private sector development of seed and fertilizer markets
- Link agro-dealer network development with improved extension services



# Investment in access to market price information

- Investment in cellphone based price data collection and dissemination
- Increase the frequency of SIMA broadcasts in each region, using existing radio stations
- Develop capacity of SIMA to assist in linking farmers with surpluses to local traders (clearing house)