

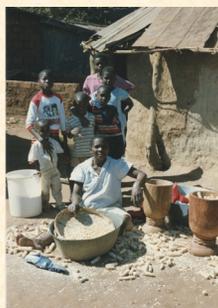
Explaining Smallholder Maize Marketing in Eastern and Southern Africa: The Roles of Market Access, Technology, and Resource Endowments

David Mather, Duncan Boughton, and T.S. Jayne

Motivation

- Given the new international food price environment and continuing rapid urbanization, African governments are anxious to increase the availability of domestically produced marketed food staple surpluses
- In most African countries, smallholders account for the majority of marketed food staples, even though only a small proportion of the rural population are net sellers
- Previous research on household food grain sales behavior in developing countries has tended to focus on the role of market access and price-related factors to explain why many rural households do not sell staple crops such as maize
- However, a key concern raised in recent literature is that low household asset endowments may constrain the ability of many smallholders to take advantage of public goods that reduce the cost of market access

- We use econometric analysis of nationally-representative smallholder panel data sets from Kenya, Mozambique, and Zambia to inform the design of public policies and investments that will enable smallholders to increase their marketed surpluses of maize, the most widely marketed cereal food staple of eastern and southern Africa (ESA)



Methods

- The conceptual framework for many of the existing empirical papers on marketed food staples is from Janvry, Fauchamps, and Sadoulet (1991), who demonstrate that costs associated with market transactions can explain why some smallholders avoid participating in food and cash crop markets
- Most empirical applications have focused almost exclusively on the role of transaction costs in discouraging market participation, yet de Janvry et al's theoretical framework also notes the role of household supply-side factors
- Use panel household survey data from Kenya (1997, 2004, 2007), Zambia (2000, 2008), and Mozambique (2002, 2005)
- Define smallholders as those with total landholding of 20 hectares or less
- Estimate a double-hurdle regression model with the probability that a smallholder sells maize and their household quantity of maize sold as dependent variables
- Use Correlated Random Effects (CRE) to control for unobserved, time-constant household-level heterogeneity
- Instrument for use of hybrid maize seed and fertilizer use

Explanatory variables in double-hurdle model of household maize sales

Agroecological factors	Household productive assets
Agroecological zone dummies	Total landholding
Seasonal rainfall	Value of equipment & livestock
Seasonal drought shocks	1=HH owns animal traction equip.
Soil type	Family labor (# of adults age 15-59)
Prices / market access	Maximum adult education level
Expected farmgate maize price	Household technology (instrumented)
Distance to district capital	1=HH used hybrid/improved maize
Distance to feeder road	Fertilizer applied to maize (kg/ha)
Household marketing assets	Household demographics
1=HH owns bicycle	Head's age
1=HH owns cart	1=HH headed by single female
1=HH owns radio OR	HH dependency ratio
1=HH has access to market price info	1=HH suffered adult death in last 3 yrs

Mean characteristics of sample smallholders

Household characteristic	Kenya (2007)	Zambia (2008)	Moz (2005)
---- HH mean values or % ----			
Total gross rural household (HH) income/AE (\$US)	620	218	121
Tropical Livestock Units (TLU)	4.2	2.4	1.0
Share of total gross HH income from crops/livestock	62	64	69
% of HH agriculture production value that is sold	46	24	20
Total area cultivated per AE (ha / AE)	0.49	0.33	0.50
Distance from village to fertilizer seller (km)	3	37	67
% of HHs that use inorganic fertilizer on maize	71	37	4
% HHs that purchase hybrid/improved maize seed	70	41	2
% HHs using animal or mechanized traction	47	34	10
% HHs receiving extension visit in past year	58	53	15
% HHs with access to credit	52	9	3
% HHs with radio	90	58	53
% HHs with bicycle	50	57	35

Findings

#1. AGROECOLOGICAL FACTORS

- Farmers in medium & high potential zones are 13% to 33% more likely to sell maize, depending on country
- A 20% increase in drought shock measure leads to: 8% (7%) reduction in probability of maize sale in Kenya (Mozambique), and a 13% (10%) reduction in quantity of maize sold in Kenya (Mozambique).
- POLICY IMPLICATION** Results highlight the sensitivity of marketed maize quantities to weather shocks, and thus the potential value of investment in climate change adaptation measures such as the development and dissemination of drought-tolerant maize varieties and widespread promotion of smallholder access to low-cost methods of irrigation and/or conservation farming techniques.

#2. MARKET ACCESS

- No significant effect of 'distance to road' or 'distance to district capital' on maize sales. Previous studies in SSA 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. For eg., the majority of smallholders in each country that sell maize did so within their village (primarily to traders)
- Does not negate the fact that a combination of market liberalization and improved road infrastructure could improve input and output prices facing smallholders, especially those in more remote areas

#3. MAIZE PRICE RESPONSIVENESS

- Significant and positive responsiveness of smallholders to farmgate maize prices in most areas of Kenya, in higher potential zones in Zambia, and among current sellers in Mozambique
- Insignificant or negative price responsiveness in lower potential zones of Zambia and Mozambique. This suggests that main constraint to selling maize is producing a surplus and/or that supply elasticity is very low due to low use of improved inputs

- POLICY IMPLICATION** In addition to road investment and other policies intended to improve prices for farmers, policymakers in Zambia/Mozambique should also consider ways to improve access to land as well as factors which affect the returns to landholding, such as improved inputs

#4. LANDHOLDING

- A 1% increase in landholding increases quantity sold by 0.3% in Kenya, 0.6% in Zambia, and 0.5% in Mozambique
- POLICY IMPLICATION:** Given that Zambia and Mozambique both contain large tracts of uncultivated land, there are opportunities to address the extremely low levels of landholding among the bottom half of the land distribution, though this will require investment in public goods, such as investments to eradicate disease constraints to animal traction use in northern Mozambique, and infrastructure investments in unsettled areas to promote migration in Zambia

#5. USE of HYBRID MAIZE SEED / INORGANIC FERTILIZER

- ZAMBIA: hybrid use results in 15% increase in probability of sale in medium & high potential zones, and a 56% increase in quantity sold (among sellers). Effects are scale-neutral.
- KENYA: hybrid use results in 23% increase in quantity sold (among sellers)
- ZAMBIA / KENYA: a 1% increase in fertilizer applied results in a 0.2% increase in quantity sold
- POLICY IMPLICATION** While question of how best to increase smallholder access to such inputs is currently the focus of much debate, these results suggest that improvements in access to input markets and extension to enable smallholders to deploy profitable technology packages are at least as important as access to output markets