Smallholder Maize Marketing in Mozambique, Kenya and Zambia

Diálogo sobre Promoção de Crescimento Agrário em Moçambique, Maputo, 21 de julho 2011

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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

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<thead>
<tr>
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<tbody>
<tr>
<td>Median rural household income $/AE</td>
<td>375</td>
<td>102</td>
<td>63</td>
</tr>
<tr>
<td>Tropical Livestock Units</td>
<td>4.2</td>
<td>2.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Median area cultivated ha/AE</td>
<td>0.22</td>
<td>0.23</td>
<td>0.38</td>
</tr>
<tr>
<td>Median % crop production marketed</td>
<td>46</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Distance from village to fertilizer seller (km)</td>
<td>3</td>
<td>37</td>
<td>67</td>
</tr>
<tr>
<td>% HHs using chemical fertilizer on maize</td>
<td>71</td>
<td>37</td>
<td>4</td>
</tr>
<tr>
<td>% HHs using purchased hybrid/improved variety</td>
<td>70</td>
<td>41</td>
<td>2</td>
</tr>
<tr>
<td>% HHs using animal/mechanized traction</td>
<td>47</td>
<td>34</td>
<td>9.5</td>
</tr>
<tr>
<td>% HHs with irrigation</td>
<td>11</td>
<td>0.6</td>
<td>1</td>
</tr>
<tr>
<td>% HHs receiving extension visit in past year</td>
<td>58</td>
<td>53</td>
<td>15</td>
</tr>
<tr>
<td>% HHs with access to credit</td>
<td>52</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>
How many smallholders sell maize?

<table>
<thead>
<tr>
<th>Maize market position</th>
<th>Mozambique</th>
<th>Zambia</th>
<th>Kenya</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autarkic (no buy or sell)</td>
<td>23.4</td>
<td>28.9</td>
<td>37.4</td>
</tr>
<tr>
<td>Buy only</td>
<td>55.5</td>
<td>52.3</td>
<td>34.4</td>
</tr>
<tr>
<td>Buy and Sell (net buyer)</td>
<td>5.5</td>
<td>4.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Sell only</td>
<td>10.5</td>
<td>11.1</td>
<td>20.3</td>
</tr>
<tr>
<td>Sell and Buy (net seller)</td>
<td>5.1</td>
<td>3.4</td>
<td>5.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
## How much maize is produced and sold?

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