Market Participation by Rural Households in a Low-Income Country: An Asset-Based Approach Applied to Mozambique

By
Duncan Boughton, David Mather, Christopher B. Barrett, Rui Benfica, Danilo Abdula, David Tschirley and Benedito Cunguara

Motivation for paper…

- Poverty reduction a major goal of development
- Recognition that agriculture is an important sector for poverty reduction in rural areas
- Market participation necessary for structural transformation from subsistence agriculture to an economy based on specialization and exchange
- A market-led paradigm of development replaced state-driven modernization from late-1970s but transformation has been slow, especially in Africa
Research gap…

- Conventional wisdom is that lack of market participation in Africa is primarily due to lack of investment in public goods (infrastructure, grades and standards, market info)
- But little attention given to the role of household asset endowments in market participation…..
- And specifically whether participation in different types of market requires different types and/or amounts of assets:
  - Spot markets versus contract
  - Quality differentiated markets

Research hypotheses…

- Asset endowments affect output levels, gross input and output prices, transactions costs and thus participation in crop markets
- Participation in markets with potentially higher returns requires greater and more differentiated asset endowments: entry barriers lead to higher returns
- Paper develops structural and reduced form models to test for participation in three types of crop markets
  - Spot market for undifferentiated staple food
  - Contract production of undifferentiated product
  - Contract production of a quality differentiated product
Structural model of household market participation choice…

\[
\text{Max } U(s, x) \quad \text{subject to a cash budget constraint:}
\]

\[
p^s x + (M^b + M^u) p^s s = (M^b + M^u) p^s f^s (A^s, G) + \sum_{i=1}^{2} M^{ci} p^{ci} f^{ci} (A^c, G) + Y
\]

and an asset allocation constraint

\[
A = A^s + A^c^1 + A^c^2
\]

and with the staple price determined by the household’s net market position:

\[
\begin{align*}
    p^* &= p^sm + \tau(Z, A, G, Y) & \text{if } s > f^s \\
    p^* &= p^sm - \tau(Z, A, G, Y) & \text{if } s < f^s \\
    p^* &= p^a & \text{if } s = f^s
\end{align*}
\]

Empirical approach…

- Two-step Heckman Sample Selection model (Goetz, 1992):
  - Estimate Probit model of market participation with RHS variables asset endowments, access to public goods, and exclusion restrictions (non-crop income sources that could affect risk perceptions and liquidity constraints)
  - estimate OLS model of log net sales with same RHS variables (except for exclusion restrictions) and including inverse Mills ratio to control for the probability of market participation

- Non-parametric kernel regression of market participation or net sales on land holdings
Household private assets and characteristics included in RHS

- Total land area
- Labor
- Animal traction
- Equipment (tractor, bike, radio irrigation)
- Education, age and gender of household head
- Agro-ecological zone
- Non-crop income sources (exclusion restrictions)

Public goods and services included in RHS

- Access to information from extension
- Access to market price information
- Distance from village to nearest administrative center
- Membership of agricultural association
First stage probit results…

<table>
<thead>
<tr>
<th>Indep Variable</th>
<th>Maize</th>
<th>Cotton</th>
<th>Tobacco</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Head</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Yield loss</td>
<td>-</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Animal Traction</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Bike</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Land area</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Land area Sq</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adults</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Adults Sq</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Self Employ Y</td>
<td></td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Livestock Y</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

N 2867 1574 2346

% participation 31.2 9.6 5.6

Second stage corrected OLS results..

<table>
<thead>
<tr>
<th>Indep Variable</th>
<th>Maize</th>
<th>Cotton</th>
<th>Tobacco</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Head</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Education Head</td>
<td></td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Education Sq</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Animal Traction</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Bike</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Land area</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land area Sq</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Maize price</td>
<td>+</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>

N 896 275 160
Distribution of cultivated land area...

Non-parametric results: market participation and land holdings
Non-parametric results: log net sales and land holdings

Summary findings on crop market participation in Mozambique …

- private household assets, especially land, positively affect participation
- Earnings increase at a sharply increasing rate in the upper tail of landholding distribution
- Access to public goods and services does not have a significant effect on participation
- Female-headed households are at significant risk of exclusion from cash crop markets
Implications…

- Investment in public goods to facilitate market access is not a sufficient condition for agricultural transformation
- Constraints to private asset accumulation to surmount land thresholds must also be addressed (questions of targeting, social returns..)
- Different strategies will be needed for households that cannot attain asset thresholds (facilitate access to off-farm income opportunities)
- Further research needed on extent to which Mozambique findings can be generalized to other African countries