Factors Associated with Farm Households’ Movement Into and Out of Poverty in Kenya: Spatial Analysis, Land Constraints and Diversification

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Quantitative Analysis of Poverty

- Cross Sectional
  - Shows Contemporaneous Correlation
  - Changes Over Time?
  - Random Shocks?
  - Unobservable Effects?

- Panel
  - Control for (time invariant) Unobserved Effects
  - Examine Changes Over Time
  - Identify Random Shocks
Research Objectives

- Understand the degree of poverty mobility – do households tend to be static over time or is there considerable mobility over time?
- Identify factors associated with consistent wealth and consistent poverty.
- Identify factors associated with rising out of (descending into) poverty

Presentation

- Data and Method
- Results
- Spatial Analysis
- Land Constraints
- Income Diversification
- Conclusions
Data:
1324 Households
1997, 2000, 2004

Method

Establish Welfare Indicator
(Asset Based)

Construct a Poverty Mobility
(Transition) Matrix

Identify Households by Mobility Status
• Consistently Poor
• Consistently Non-Poor
• Rising from Poverty
• Falling into Poverty
• “Other” Non-Coded Paths

Descriptive Analysis
• Cross-Tabulations

Econometric Analysis
• Initial Condition Probit Model
  (Probability Analysis)
  • First Difference Model
    - Household Decisions

Rural Kenyan Poverty Over Time

Poverty Dynamics Findings

- 57% Remain in Same Tercile 1997 – 2004
- High Level of Inequality
  - 2004 Value of Assets for Consistently Poor Households Averages 13% of the 1997 Sample Median Value
  - 808% for the Consistently Wealthy

Spatial Analysis
Share of Poverty Groups by Distance to Road Quartiles

<table>
<thead>
<tr>
<th>Motorable Road Distance</th>
<th>Consistently Low Tercile</th>
<th>Consistently High Tercile</th>
<th>Rising from Poverty</th>
<th>Declining into Poverty</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest (&lt;.1 km)</td>
<td>13.4</td>
<td>32.9</td>
<td>11.8</td>
<td>8.1</td>
<td>19.6</td>
</tr>
<tr>
<td>Mid-Near (.1 to .25 km)</td>
<td>20.3</td>
<td>28.9</td>
<td>32.4</td>
<td>32.4</td>
<td>30.2</td>
</tr>
<tr>
<td>Mid-Far (.25 to 1.5 km)</td>
<td>35.9</td>
<td>26.5</td>
<td>32.4</td>
<td>40.5</td>
<td>27.7</td>
</tr>
<tr>
<td>Farthest (&gt;1.5 km)</td>
<td>30.4</td>
<td>11.6</td>
<td>23.5</td>
<td>18.9</td>
<td>22.5</td>
</tr>
</tbody>
</table>
Spatial Analysis

Share of Poverty Groups by Ecological Potential

<table>
<thead>
<tr>
<th>Asset Poverty Category</th>
<th>Consistently Low Tercile</th>
<th>Consistently High Tercile</th>
<th>Rising from Poverty</th>
<th>Declining into Poverty</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Zones by Potential</td>
<td>percent of poverty group</td>
<td>----------------------------</td>
<td>---------------------</td>
<td>------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Highest(^a)</td>
<td>14.7</td>
<td>53.4</td>
<td>17.6</td>
<td>21.6</td>
<td>23.3</td>
</tr>
<tr>
<td>Mid-High(^b)</td>
<td>6.0</td>
<td>26.1</td>
<td>8.8</td>
<td>8.1</td>
<td>20.6</td>
</tr>
<tr>
<td>Mid-Low(^c)</td>
<td>32.7</td>
<td>10.8</td>
<td>32.4</td>
<td>18.9</td>
<td>26.6</td>
</tr>
<tr>
<td>Lowest(^d)</td>
<td>46.5</td>
<td>9.6</td>
<td>41.2</td>
<td>51.4</td>
<td>29.6</td>
</tr>
</tbody>
</table>

(a) High Potential Maize. (b) Central Highlands. (c) Western Highlands, Western Transitional, and Marginal Rain Shadow. (d) Western Lowlands, Eastern Lowlands, Coastal Lowlands

Spatial Analysis

- Compounded Spatial Wealth Barriers
  - Lowest Agro-Ecological Potential Zones
  - Farthest from Motorable Roads
  - Highest Fares to Market

- Identifies 77 Households (6% of Sample)
  - 26% (20 hh) Consistently Poor
  - 1% (1 hh) Consistently Non-poor
  - 7% (5 hh) Rising from Poverty
  - 66% (51 hh) Non-Coded Poverty Paths
Analysis of Variance

- Zones – 4.6%
- Districts – 8.2%
- Village – 17.8%

Analysis of Variance

- Household Characteristics – 18.2%
  - Controlling for:
    - Formal Employment
    - Age
    - Education
    - Land Tenure.
    - Household Size
    - Distance to Road
    - Access to Land
The Role of Land Constraints

- The Consistently Poor
  - 55% on Small (Less than 1.6 Acres) Farms
  - 84% Controlling Less than 3.25 Acres

- The Consistently Non-Poor
  - 57% Controlling More than 3.25 Acres
Cultivated Land Per Agricultural Person (ha)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>0.508</td>
<td>0.450</td>
<td>0.363</td>
<td>0.252</td>
</tr>
<tr>
<td><strong>Kenya</strong></td>
<td>0.459</td>
<td>0.350</td>
<td>0.280</td>
<td>0.229</td>
</tr>
<tr>
<td>Mozambique</td>
<td>0.389</td>
<td>0.367</td>
<td>0.298</td>
<td>0.249</td>
</tr>
<tr>
<td>Rwanda</td>
<td>0.215</td>
<td>0.211</td>
<td>0.197</td>
<td>0.161</td>
</tr>
<tr>
<td>Zambia</td>
<td>1.367</td>
<td>1.073</td>
<td>0.896</td>
<td>0.779</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>0.726</td>
<td>0.664</td>
<td>0.583</td>
<td>0.525</td>
</tr>
</tbody>
</table>

Source: FAOStat website; Source: FAO Stat database: www.faostat.fao.org/

Determinants of Land Access

- Jayne *et. al.* (2003) Demonstrate that Much (Most) of the Variation in Land Access Determined *Within* Villages
  - Study of 5 Countries (Including Kenya)
  - Some Key Determinants
    - Household Size (Large = More Total, Less Per Capita Land)
    - Gender of Household Head
    - Education of Head
Income Diversification

- Increased Crop Diversification across All Groups
- Low-Barrier, Low Return Off-Farm Diversification among the Poor and Declining Households
- Livestock Diversification (Animals and Products) by the Non-Poor and Rising Households

The Dairy Market
The Dairy Market

- The Consistently Non-Poor
  - More Likely to Be Producing
  - More Commercialized
  - Bigger Share of Total Income
- Rising Wealth Over Time
  - Highly Correlated with Entering the Market

Initial Condition based Probability Simulation Of Being Consistently Poor or Non-Poor

<table>
<thead>
<tr>
<th>State of Nature</th>
<th>Area Farmed (Acres)</th>
<th>Primarily Owns Land</th>
<th>Produce Milk</th>
<th>Sell Bulls or Cows</th>
<th>Probability of Being Non-Poor</th>
<th>Probability of Being Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark</td>
<td>3.6</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>.02</td>
<td>.30</td>
</tr>
<tr>
<td>Sell Bulls and Produce Milk</td>
<td>3.6</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>.23</td>
<td>.05</td>
</tr>
<tr>
<td>Land Rich, Sell Bulls, Produce Milk</td>
<td>8.98</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>.51</td>
<td>.00</td>
</tr>
</tbody>
</table>

Source: Tegemeo survey data 1997, 2000, 2004
Based on Probit estimates controlling for agro-ecological zones, area cultivated in 1997, household head age and years of education in 2000, the number of full time adult equivalents, distance to a tarmac road, that distance squared, as well as dummy variables for whether major land tenure is ownership with deed, male head of household, whether household suffered a prime-age death, and dummies for participation in the following markets in 1997: bulls and cows, chickens, goats, other livestock, milk, and eggs. All controls not shown in this table are held at their data means, unless otherwise specified.
Success Stories

- Small Farms with Primarily Off-Farm Income
  - Crop and Livestock on Farm
  - High Entry Barrier Off-Farm Activities

- Medium Sized Farms
  - Cash Crops
  - Livestock Provide Largest Share of Income
    - Selling Bulls and Cows
    - Dairy

- Large Farms
  - Focus on Staple Crops

Conclusions

I. Geographic Conditions and Spatial Poverty Traps Are Evident, but Are Not Fully Explaining Variations in Wealth.

II. Interventions Need to Acknowledge Asset Inequality and Understand Asset Position of Target Households
Conclusions (continued)

III. Household livelihoods are multi-dimensional: designed to enable diversification
  - But some livelihood strategies are more successful than others
  - Spatial Concerns
    - Transactions Costs (infrastructure)
    - Market Access (inputs and outputs)
  - Household Specific Issues
    - Education
    - Family Sizes
    - Credit Access (not explicitly studied here)
    - Technical Support
    - Landholding size (we have a problem in Kenya and many areas – farm sizes are shrinking over time, making many rural hhs increasingly unviable for the long run)

Thank You

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### Rural Kenyan Household Poverty Movements Over Time

<table>
<thead>
<tr>
<th>Poverty Mobility Group</th>
<th>Household Rank in terms of welfare terciles (Bottom 3rd Middle 3rd Top 3rd) 1997 2000 2004</th>
<th>Number of Households</th>
<th>Percent of Total Sample (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rising from Poverty</td>
<td>Bottom Bottom Top 9 0.7 Bottom Middle Top 17 1.3 Bottom Top Top 8 0.6</td>
<td>34</td>
<td>2.6</td>
</tr>
<tr>
<td>Declining into Poverty</td>
<td>Top Top Bottom 10 0.8 Top Middle Bottom 16 1.2 Top Bottom Bottom 11 0.8</td>
<td>37</td>
<td>2.8</td>
</tr>
<tr>
<td>Consistently Non-Poor</td>
<td>Top Top Top 249 18.8 Bottom Bottom Bottom 217 16.4</td>
<td>573</td>
<td>43.3</td>
</tr>
<tr>
<td>Consistently Poor</td>
<td>Bottom Bottom Bottom 217 16.4 Bottom Bottom Bottom 217 16.4</td>
<td>573</td>
<td>43.3</td>
</tr>
<tr>
<td>Consistently in the Middle</td>
<td>Middle Middle Middle 107 8.1</td>
<td>107</td>
<td>8.1</td>
</tr>
<tr>
<td>Otherwise in the same wealth tercile in 1997 and 2004</td>
<td>Bottom Middle Bottom 49 3.7 Bottom Bottom Bottom 5 0.4 Middle Bottom Middle 50 3.8 Middle Top Middle 38 2.9 Top Bottom Top 10 0.8 Top Middle Top 34 2.6</td>
<td>186</td>
<td>14.0</td>
</tr>
<tr>
<td>Smaller increases in relative welfare over time</td>
<td>Bottom Bottom Middle 59 4.5 Bottom Middle Middle 67 5.1 Bottom Top Middle 10 0.8 Middle Bottom Top 10 0.8 Middle Middle Top 50 3.8 Middle Top Top 54 4.1</td>
<td>230</td>
<td>18.9</td>
</tr>
<tr>
<td>Smaller decreases in relative welfare over time</td>
<td>Top Top Middle 55 4.2 Top Middle Middle 43 3.2 Top Bottom Bottom 13 1.0 Middle Top Bottom 12 0.9 Middle Middle Bottom 59 4.5 Middle Bottom Bottom 62 4.7</td>
<td>244</td>
<td>18.4</td>
</tr>
<tr>
<td>Total Sample</td>
<td>1324 100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### List of Assets in Wealth Measure

- Ploughs
- Animal Traction
- Cart
- Trailer
- Tractor
- Cars
- Trucks
- Spray Pump
- Irrigation Equipment
- Water Tanks
- Stores
- Wheelbarrow
- Combine Harvester
- Donkey
- Bulls
- Chickens
- Goats
- Sheep
- Calves
- Cows
- Pigs
- Turkeys
- Ducks
Spatial Analysis

Share of Poverty Groups by Village to Market Fare Quartiles

<table>
<thead>
<tr>
<th>Asset Poverty Category</th>
<th>Consistently Low Tercile</th>
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<tbody>
<tr>
<td>Village to Market Fare Quartiles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheapest (&lt;20 Ksh)</td>
<td>30.0</td>
<td>26.5</td>
<td>11.8</td>
<td>10.8</td>
<td>22.0</td>
</tr>
<tr>
<td>Mid-Cheap (20-30 Ksh)</td>
<td>22.6</td>
<td>28.9</td>
<td>14.7</td>
<td>37.8</td>
<td>28.8</td>
</tr>
<tr>
<td>Mid-Expensive (30-47 Ksh)</td>
<td>18.4</td>
<td>18.1</td>
<td>35.3</td>
<td>27</td>
<td>26.7</td>
</tr>
<tr>
<td>Most Expensive (&gt;47 Ksh)</td>
<td>29.0</td>
<td>26.5</td>
<td>38.2</td>
<td>24.3</td>
<td>22.5</td>
</tr>
</tbody>
</table>

First Differences Estimation

- **Note:** Explicitly Controls for Spatial Effects on Wealth that Do Not Change Over Time
- **Change in Total Value of Productive Assets for Entry Into Market for:**
  - Dairy -> +33,600 Ksh
  - Bulls/Cows -> +26,500 Ksh
  - Goats/Sheep -> +32,500 Ksh