Research Findings on Alternative Approaches for Raising Smallholder Agricultural Productivity

Implications for USAID Support for the CAADP Program

T.S Jayne
with colleagues from MSU

Panel Discussion, USAID/Africa Bureau, Washington DC
January 24, 2008

Current thinking on “strategy”

- Strong consensus about need for greater investment in public goods (infrastructure, crop science) and certain policy reforms
- Major debate with regard to what constitutes the right “enabling environment”
  - Input subsidies – “smart” subsidies
  - food price support/stabilization
  - the role of regional trade
- Not sufficient to say “we’re committed to more investment in agriculture”
  - What kind of investments
  - What kind of policy environment
Sub-Saharan Africa: Nitrogen, Phosphate, Potash, and Total NPK Consumption, 1990/91 - 2002/03

Source: Bumb, 2003, Derived from FAO data.

Kenya (31.8, +33%)
Swaziland (30.5, -40%)
Malawi (30.8, +9%)
Zimbabwe (48.3, +9%)

Uganda (0.6, +237%)
Rwanda (1.8, +89%)
Mozambique (3.2, +142%)
Ghana (3.6, +68%)
Chad (4.3, +93%)

Mauritania (4.0, -64%)
Togo (7.0, +30%)

DRC (0.5, -47%)
Angola (0.7, -69%)
Niger (0.9, +5%)
Guinea (2.0, -4%)
Burundi (2.3, -6%)
Madagascar (2.9, -8%)
Mauritania (4.0, -64%)
Tanzania (4.8, -47%)
Gambia (5.2, +15%)
Nigeria (5.6, -73%)
Burkina Faso (5.9, -28%)
Zambia (8.4, -34%)
Mali (9.0, +7%)

< 25 kg/ha

< +30% > +30%

Uganda (0.6, +237%)
Rwanda (1.8, +89%)
Mozambique (3.2, +142%)
Ghana (3.6, +68%)
Chad (4.3, +93%)

Cote d'Ivoire (11.8, +53%)
Botswana (11.8, +294%)
Senegal (13.2, +67%)
Ethiopia (14.4, +71%)
Benin (17.6, +76%)
Lesotho (23.2, +35%)

> 25 kg/ha

Swaziland (30.5, -40%)
Malawi (30.8, +9%)
Zimbabwe (48.3, +9%)

Kenya (31.8, +33%)
Fertilizer use trends in Kenya, 1990-2006

% of Small-Scale Farmers Using Fertilizer

<table>
<thead>
<tr>
<th>Region</th>
<th>1995/96</th>
<th>1996/97</th>
<th>1999/00</th>
<th>2003/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Lowlands</td>
<td>2%</td>
<td>3%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Eastern Lowlands</td>
<td>19%</td>
<td>30%</td>
<td>37%</td>
<td>46%</td>
</tr>
<tr>
<td>Western Lowlands</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>Western Transitional</td>
<td>29%</td>
<td>32%</td>
<td>59%</td>
<td>61%</td>
</tr>
<tr>
<td>High Potential Maize Zone</td>
<td>67%</td>
<td>69%</td>
<td>86%</td>
<td>90%</td>
</tr>
<tr>
<td>Western Highlands</td>
<td>52%</td>
<td>57%</td>
<td>73%</td>
<td>74%</td>
</tr>
<tr>
<td>Central Highlands</td>
<td>63%</td>
<td>78%</td>
<td>90%</td>
<td>93%</td>
</tr>
<tr>
<td>Marginal Rain Shadow</td>
<td>12%</td>
<td>20%</td>
<td>22%</td>
<td>27%</td>
</tr>
<tr>
<td>Nationwide Sample</td>
<td>43%</td>
<td>51%</td>
<td>64%</td>
<td>69%</td>
</tr>
</tbody>
</table>
Reasons for the Upsurge in Fertilizer Use in Kenya

1. GoK has maintained a stable fertilizer policy stance since 1990
   - Eliminated import licensing quotas
   - Foreign exchange controls
   - Retail price controls
   - No large subsidy programs to undercut private investment in fertilizer distribution system

2. Private sector investment in fertilizer distribution has expanded rapidly
   - 10-11 importers
   - 500 wholesalers
   - 8,000 retailers
Reasons for the Upsurge in Fertilizer Use in Kenya

3. Small farmers’ are now much closer to fertilizer retailers
   - 1997: 8.4kms
   - 2004: 4.3kms

4. Large decline in fertilizer (DAP) marketing margins
What about fertilizer subsidies?

1. Need dispassionate assessments of costs and benefits
2. Some governments will press ahead with subsidy programs regardless – what should USAID do in such cases?
   - Are there complementary investments that would raise the effectiveness of subsidy programs?

Malawi

Change in Fertilizer Acquisition/Use Between '03 & '07

Slope: -0.48
<table>
<thead>
<tr>
<th>Zambia</th>
<th>Total Income</th>
<th>Assets</th>
<th>Landholding size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>‘000 kwacha per capita</td>
<td>ha per capita</td>
<td></td>
</tr>
</tbody>
</table>

**Fertilizer source:**

| Households not acquiring fertilizer: | 266 | 173 | .15 |

Source: Govereh et al, 2006

<table>
<thead>
<tr>
<th>Zambia</th>
<th>Total Income</th>
<th>Assets</th>
<th>Landholding size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>‘000 kwacha per capita</td>
<td>ha per capita</td>
<td></td>
</tr>
</tbody>
</table>

**Fertilizer source:**

| Households not acquiring fertilizer: | 266 | 173 | .15 |
| Cash purchases from private retailers: | 774 | 342 | .20 |

Source: Govereh et al, 2006
Zambia

<table>
<thead>
<tr>
<th>Fertilizer source:</th>
<th>Total Income</th>
<th>Assets</th>
<th>Landholding size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>‘000 kwacha per capita</td>
<td>ha per capita</td>
<td></td>
</tr>
<tr>
<td>Households not acquiring fertilizer:</td>
<td>266</td>
<td>173</td>
<td>.15</td>
</tr>
<tr>
<td>Cash purchases from private retailers:</td>
<td>774</td>
<td>342</td>
<td>.20</td>
</tr>
<tr>
<td>Government Fertilizer Support Program (50% subsidy)</td>
<td>804</td>
<td>425</td>
<td>.23</td>
</tr>
</tbody>
</table>

Source: Govereh et al, 2006

5. Price of maize: Zambia

20th percentile of prices: US$ 114
50th percentile of prices: US$ 142
75th percentile of prices: US$ 187
25th percentile of prices:
US$ 103/mt

50th percentile of prices:
US$ 143/mt

75th percentile of prices:
US$ 169/mt

Scenario 1: Distribution of Benefit-Cost Ratios, Malawi
Fertilizer Subsidy Program: Historical maize prices, Chitipa

Mean = 0.736
Scenario 2: Distribution of Benefit-Cost ratios, Malawi fertilizer subsidy program: Mean maize prices of $200/mt

Mean = 1.207

Scenario 3: Distribution of benefit-cost ratios, Malawi subsidy program: mean $200 maize prices and $625 fertilizer cost

Mean = 0.998
• 2006/07 fertilizer subsidy program in Malawi:
  **B/C ratio: 0.83 – 1.50**
  **average B/C ratio: 0.74**
• Average of all simulations in Zambia, using alternative parameter estimates:
  **B/C ratio: 1.07**
• These B/C estimates assuming FSP fertilizer is delivered on time and used in correct proportions
• Caveat: some indirect impacts of fertilizer subsidy programs are not included in B/C ratios

Three reasons for estimated low B/C ratio of fert subsidy programs:

1. Relatively low maize-fertilizer response rates (need for improved farm management, know-how!)
2. Poor targeting
   • One must question where “smart subsidies” are politically feasible
3. Displacement of commercial sales → limited overall additional fertilizer use
Factors that could improve B/C ratio of fertilizer subsidies (and smallholder productivity)

1. Target relatively poor farming households
   - This will minimize displacement and have the most direct effect on poverty reduction
2. Target FSP to areas where private traders are not already active (use PHS data to determine areas)
3. Reduce recommended fertilizer application levels – 200kg Compound D + 200kg Urea appears to be in stage 3 of production function
4. Prioritize R&D to generate improved fertilizer-responsive seeds
5. Open regional trade (especially in good harvest years) will raise and stabilize the price of maize → improve profitability of using fertilizer on maize
**IFPRI review of rate of return studies:**

<table>
<thead>
<tr>
<th>Investments</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidies</td>
<td>Negative – 12%</td>
</tr>
<tr>
<td>- research &amp; extension</td>
<td>35% to 70%</td>
</tr>
<tr>
<td>- roads</td>
<td>20% to 30%</td>
</tr>
<tr>
<td>- education</td>
<td>15% to 25%</td>
</tr>
<tr>
<td>- communications</td>
<td>10% to 15%</td>
</tr>
<tr>
<td>- irrigation</td>
<td>10% to 15%</td>
</tr>
</tbody>
</table>

If we believe these findings, they have major implications.

**Budget allocation to Agricultural Sector in Zambia: ZMK465 million in 2005**
As massive as the poverty problems are now, they will be much greater unless budgets are re-allocated sooner or later to investments that will make the economy productive in the long-term:

- Population growth w/o productivity growth → civil strife
- Not a viable option to have more and more “fragile” or “failed” states

Upshot for supporting CAADP

1. Continue to support local and regional policy processes for helping governments make appropriate policy choices
2. Be more concrete about which kinds of public investments are needed, and which are not
3. Capacity strengthening for
   • COMESA itself
   • Regional policy networks
   • National governments through local capacity building
4. Indirectly coordinate with other donors (e.g., to be more selective about budget support)
Thank you

http://www.aec.msu.edu/fs2/