Empirical Data on Smallholders in Zambia – Nation Wide Random Surveys

Map of Central Statistical Office Statistical Enumeration Areas (SEAs) Sampled in the CSO/MACO/FSRP Post Harvest and Supplemental Surveys in 2001 and 2004 by Zambia’s Agro-Ecological Zones
I. Outline - Public Expenditures in Zambian Agriculture

- Joint MACO/FSRP assessment of public agricultural expenditures
  - Why spend on agriculture?
  - Composition and trends of GOZ spending
  - Returns to suggested alternative public investments
Why Should Zambia Spend on Agriculture?

• Achieve economic growth & poverty reduction goals of FNDP
• Stimulate private sector investments
• Invest in necessary public goods
• “No country has been able to sustain a rapid transition out of poverty without raising productivity in its agricultural sector.” Timmer, 2005

What Investments Drive Productivity Growth in Agriculture?

• Technology (research on crops/livestock, extension, processing improvements)
• Markets (property rights, standards, contract law, adjudication, market facilities, market price and supply information, marketing extension)
• Infrastructure (roads, power, ports, communications)
Average Composition of Agricultural Spending, 2001 - 2006

- Personnel Emoluments: 12%
- Recurrent Departmental charges: 7%
- Grants and other payments: 2%
- Agriculture development programs: 18%
- Capital Expenditure: 4%
- Agric spending allocated through other ministries: 9%
- Poverty Reduction Programmes/HIPC: 48%

Trends in poverty reducing investments
(PRPs + agricultural spending through other ministries)

- Output subsidies
- Input subsidies
- Growth-enhancing measures
Resource Allocation in the Ministry of Agriculture & Cooperatives, 2006

Public Resource Allocation for the Agricultural Sector, 2007
## Spending for Agricultural Productivity Growth

<table>
<thead>
<tr>
<th></th>
<th>What are the Returns?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidies for recurrent (private) inputs</td>
<td></td>
</tr>
<tr>
<td>Public Investments</td>
<td></td>
</tr>
<tr>
<td>- technology (R&amp;D,ext)</td>
<td></td>
</tr>
<tr>
<td>- roads</td>
<td></td>
</tr>
<tr>
<td>- communications</td>
<td></td>
</tr>
<tr>
<td>- irrigation</td>
<td></td>
</tr>
</tbody>
</table>

### Agricultural Subsidies for Recurrent (private) Inputs

- Returns frequently **negative**

1% increase in budget share on agricultural subsidies **reduces** per capita agricultural income by .3% to .5%

15 Latin American countries, Lopez (2006)
Why Frequent Negative Returns?

- Subsidized inputs crowd out the private sector deliveries & discourage investments in new private fertilizer sales networks
- Misallocation and inefficiencies in usage does not encourage sustainable fertilizer use
- Diversion and rent seeking raises incomes of some but does little to raise crop productivity
- Late delivery of inputs does not improve productivity

Agricultural Subsidies

- Returns sometimes positive, but generally lower than in investments

$1 in ag. R&D → $4.30 in ag. Income
$1 in ag. subsidies → $1.70 in ag income

What Influences the Benefit/Cost Ratio of Private Input Subsidies

• New seed/management technology becomes available to raise economic output
• Farmers have control over water
• Good extension services are present to assist learning
• Information/will is available to help target assistance to those farmers who otherwise would not use the private market
• Subsidies are rotated to different users each year to accomplish more new technology learning
• Scarce public funds always have an opportunity cost. If used for subsidies for private goods, who pays for needed public goods to complement private goods?

Public Investments in Agricultural Research

<table>
<thead>
<tr>
<th></th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>78%</td>
</tr>
<tr>
<td>Latin America</td>
<td>53%</td>
</tr>
<tr>
<td>Africa</td>
<td>50%</td>
</tr>
</tbody>
</table>

Allston et al (2005): 680 studies
# Investments in Rural Uganda

<table>
<thead>
<tr>
<th>Returns to government spending (B/C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural R&amp;D</td>
</tr>
<tr>
<td>Feeder roads</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Health</td>
</tr>
</tbody>
</table>

## Summary: Returns to Alternate Forms of Ag. Spending

![B/C ratio chart](chart.png)
I. Summary- Investment Implications & Challenges for Zambia to Reach FNDP goals

• Investment Composition:
  – allocation increasingly focuses on low return spending on private goods (financing maize and fertilizer)
  – at the expense of high return investments in productive public goods (research, extension, roads, communications, timely information, irrigation)

II. Maize Production & Marketing Features and Issues

• The diversification success story has reduced maize production in areas where other crops have a comparative advantage
• But maize productivity among a majority of smallholders in remaining areas has not improved – maize grain purchases are vital for poor rural & urban consumers
• There is a production & marketing maize success story for a relatively small segment of the smallholder sector
• Re-emergence of FRA large-scale pan-territorial maize pricing across Zambia risks reversing the progress in crop diversification
• Govt investments in market facilitating infrastructure, timely price, stock and production information essential
Zambia Annual Growth Rates, Selected Crops 1992/3-2001/02

Key Patterns of Smallholder Maize Production and Marketing 2000 & 2004 mkt years

- Some 80% of smallholders produce maize
- Only 25-28% of smallholders sell any maize
- Sales % of national production range 23/27 %
- Vast majority of maize produced is stored and eaten on the farm – traditional on-farm storage needs help
- Production and sales are highly correlated with area cropped to maize – improved marketing requires information on best time of season to sell & best market buyers
- 35% of smallholders are net buyers (grain & meal)
- 37% not in the market as seller nor buyers
Sales and Area Cropped by Type of Maize Seller/Buyer

<table>
<thead>
<tr>
<th>Type of maize seller</th>
<th>Net Sellers</th>
<th>Net Buyers/With Production</th>
<th>Net Buyers/No Production</th>
<th>Not in market</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>25-28 %</td>
<td>25 %</td>
<td>10 %</td>
<td>37 %</td>
</tr>
<tr>
<td>HH</td>
<td>HH</td>
<td>HH</td>
<td>HH</td>
<td>HH</td>
</tr>
</tbody>
</table>

Mean Net maize + maize meal sales (purchases) US $

- Not in market: 150.00
- Net Buyers/No Production: 100.00
- Net Buyers/With Production: 50.00
- Net Sellers: 0.00

Mean cropped area (Ha)

- Not in market: 3.00
- Net Buyers/No Production: 2.50
- Net Buyers/With Production: 2.00
- Net Sellers: 1.50

Value Maize Production by Type of Maize Seller/Buyer

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Mean Value of maize production in US dollars

- Not in market: 300.00
- Net Buyers/No Production: 200.00
- Net Buyers/With Production: 100.00
- Net Sellers: 0.00

Mean cropped area (Ha)

- Not in market: 3.00
- Net Buyers/No Production: 2.50
- Net Buyers/With Production: 2.00
- Net Sellers: 1.50
**Short-Run Maize Marketing Situation-1**

- FRA direct interventions in maize mkt – modest increase since 2001; very large increase in 2006 election year with high financial and economic costs
  - FRA may have bought as much as 70,000 mt of maize from Mozambique and Tanzania in 2006 (see Annex for further details)
- Maize export opportunities in 2006/07 mostly lost – FRA is a high price/cost supplier & private traders mostly precluded from exporting
  - Zambia is loosing export opportunities (esp to DRC) when regional and international maize markets tighten
  - Zambia has potential to become a reliable regional supplier & draw on Moz/Tan/South Africa when supplies are short.
Short-Run Maize Marketing Situation-2

- FRA plans for 2007 – Same/higher goals & uncertainty for private traders and commercial farmer domestic storage, sales and exports.
- Very large maize inventory carrying costs, high risks of grain quality deterioration and related cost
- FSP private good financing also end up going disproportionately to better off smallholders
Given Smallholders Differences - Effects FRA Policy of Concentration of Smallholder Maize Production & Sales

- Only 25-28% of the smallholder households in Zambia sell maize in a normal year.
- But only 2% of these smallholder selling households (24,256 farms) account for 50% of the sales of maize.
- Some 35% of rural households are net buyers of maize – higher prices disadvantage these households.

Characteristics of Smallholder Farmers By Maize Sales Groups, Zambia PHS / FSRP Supplemental Survey - 2003/04 Mkt Season

<table>
<thead>
<tr>
<th>Maize Sales Groups</th>
<th>N=</th>
<th>Crop area (ha)</th>
<th>Asset values (Kw 000)</th>
<th>Gr. Rev., maize sales (Kw 000)</th>
<th>Gr. Rev., crop sales (Kw 000)</th>
<th>Total hh income (Kw 000)</th>
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<tr>
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<td>24,255</td>
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<td>3,622</td>
<td>4,323</td>
<td>15,727</td>
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<td>Rest of smallholder maize sellers</td>
<td>330,104</td>
<td>2.0</td>
<td>1,348</td>
<td>271</td>
<td>548</td>
<td>3,102</td>
</tr>
<tr>
<td>Households not selling maize</td>
<td>890,682</td>
<td>1.3</td>
<td>1,080</td>
<td>0</td>
<td>283</td>
<td>1,956</td>
</tr>
</tbody>
</table>

Similar patterns were found in the panel base year: 1999/00 for the PHS/Supplemental.
Effects of Raising Maize Prices Above Market Clearing Levels

- Higher maize prices hurt the majority of the population who are net maize buyers
- Net maize buyers tend to be relatively poor farmers
- Zambia becomes a high price supplier to regional mktst and tends to lose market opportunities
- Many smallholders need improved technology to produce on less area enough maize to eat & raise incomes from selling other crops and labor services
- Since smallholder sales are so concentrated, FRA price-raising policies have highly regressive effects on income distribution
- Distribution of input subsidies also relatively concentrated according to production but many of these same smallholders are able to purchase inputs
- Competition policy in Zambia to keep maize meal prices low has been a major success story but need more small mills

Good News for Zambian Consumers - Tangible Benefits of GOZ & Commercial Development & Competition in The Maize Milling Industry:

![Graph showing Lusaka: Price trends with year/month data from 1994:5 to 2005:5. The graph includes data for Wholesale grain and Breakfast meal, with linear trends indicated. Source: Agricultural Marketing Information Centre-Zambia-various years.](image-url)
Other Factors - Why is Maize Production & Marketing Not Thriving?

Information base required for government & private sector investors to make informed and timely decisions needs significant improvement

- CFS and PHS surveys are becoming increasingly inaccurate as measures of smallholder agricultural production
- Large scale maize production info. is especially unreliable
- Small-scale production estimates do not take enough account of rural population growth
- Over time, production levels are increasingly underestimated
- Timely stocks information (for traders & farmers) is lacking
- Inadequate market information, analysis & outreach to assist smallholder determine best when to store & sell

Caution Regarding Size and Role of FRAs Strategic Reserve

- All evidence indicates that relying on regional trade is much more cost effective than very large and costly strategic stocks – cost to maintain grain quality and uncertainty on private sector storage investments of large FRA stocks overhanging the market
- Size of strategic stock need not be more than 2-3 months, because this is time required for imports
- GOZ needs timely information on production, stocks and local markets to make strategic import/export decisions
- These issues already addressed in AMDP
- Waiting for implementation of AMDP
- FRA’s role needs to be predictable, stable and facilitating
- FRA could use maize market forward options contracts on South African maize to secure potential future supply access
III. Fertilizer Use, Distribution & Marketing

Guiding principals - soil fertility enhancement & use of inorganic fertilizers in Zambia

- Productivity growth requires fertility improvement
- Sustainability of improvements is key – importance of conservation farming and agro-economic regions
- Profitability of input use determines sustainability
- Crop choice by region and complementary inputs to fertilizer are critical for sustainability
- There is a smallholder learning curve on crops, management and fertilizer use – public/private extension
- Private dealer network for selling fertilizer and related inputs is key to long-term sustainability
- Free and/or subsidized fertilizer/other inputs is always highly political and subject to rent seeking as part of the targeting process. High transaction cost to reduce leaks

Fertilizer Supply in Zambia by Year: Commercial Versus Non-Commercial

![Graph showing fertilizer supply in Zambia by year: Commercial Versus Non-Commercial](image)

Source: Fertilizer importers and Agricultural Statistical Bulletin
Spatial Focus of Private Sale and Public Fertilizer programs in Zambia, 2002/03*

<table>
<thead>
<tr>
<th>Average % of farmers in each SEA buying from private outlets</th>
<th>Farmer fertilizer acquisition behavior within the SEAs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-users</td>
<td>From FSP</td>
</tr>
<tr>
<td>Zero %</td>
<td>39</td>
<td>7</td>
</tr>
<tr>
<td>Btwn 0 &amp; 25%</td>
<td>31</td>
<td>23</td>
</tr>
<tr>
<td>Btwn 25 &amp; 50%</td>
<td>21</td>
<td>37</td>
</tr>
<tr>
<td>More than 50%</td>
<td>8</td>
<td>33</td>
</tr>
<tr>
<td>Total %</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Total # of farmers</td>
<td>907,239</td>
<td>102,450</td>
</tr>
</tbody>
</table>

*National representative sample of 350+ CSO Stand Enumeration Areas (SEAs)- [the lowest geographic sampling unit in the CSO sampling framework for its annual Post Harvest Surveys. Each SEA contains roughly 150 to 200 rural households.

Which Smallholders are Using Fertilizer? - Use Patterns by Source of Procurement & by Household Wealth Status, 2002/03 prod. season

<table>
<thead>
<tr>
<th></th>
<th>Smallholder households receiving fertilizer from government program</th>
<th>Smallholder households purchasing fertilizer from commercial retailers</th>
<th>Smallholder households not using inorganic fertilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of total national household samplea</td>
<td>13.9%</td>
<td>15.3%</td>
<td>79.1%</td>
</tr>
<tr>
<td>Kgs fertilizer acquired per household</td>
<td>122</td>
<td>120</td>
<td>0</td>
</tr>
<tr>
<td>Total household income (000 kwacha)</td>
<td>804</td>
<td>774</td>
<td>266</td>
</tr>
<tr>
<td>Asset value (000 kwacha per capita)</td>
<td>425</td>
<td>342</td>
<td>173</td>
</tr>
<tr>
<td>Landholding size (ha per capita)</td>
<td>0.23</td>
<td>0.20</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Note: a row adds to more than 100% because a small proportion of households acquired fertilizer from government and purchased fertilizer from private retail.

What Can We Learn - Looking at Maize Sales & Fertilizer Use

- All smallholders using fertilizer are relatively better off – from income, assets & land access perspective
- Overall smallholder gaining access to subsidized fertilizer are the best off, then those purchasing and finally non-users
- 2% of smallholders who market 50% of maize are heavy fertilizer users (92%) getting about half their needs from govt programs (averaging 20 bags of fert. per hh.)
- Rest of maize sellers group – about ½ the farmers selling use fertilizer, with more coming from the market than from govt
- Most non-users don’t produce enough maize to sell, but a group of non-maize sellers are using fertilizer from both govt and private market sources

Characteristics of Smallholder Farmers
By Maize Sales Groups, Zambia PHS / FSRP Supplemental Survey - 2003/04 Mkt Season

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<td>0</td>
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</table>

Similar patterns were found in the panel base year: 1999/00 for the PHS/Supplemental
### Fertilizer Sources and Use by Smallholder Maize Sales Groups, 2003/04 Marketing Season

<table>
<thead>
<tr>
<th>Maize sales groups</th>
<th>Number of HHs</th>
<th>% of Fertilizer users</th>
<th>Total quantity purchased (tons)</th>
<th>Share of FSP fertilizer (%)</th>
<th>Share of commercial fertilizer (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 50% of maize sellers</td>
<td>24,255</td>
<td>92</td>
<td>19,960</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Rest of maize sellers</td>
<td>330,104</td>
<td>51</td>
<td>38,951</td>
<td>38</td>
<td>47</td>
</tr>
<tr>
<td>Households not selling</td>
<td>890,682</td>
<td>22</td>
<td>32,063</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,245,041</strong></td>
<td><strong>31</strong></td>
<td><strong>90,974</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

### Average Smallholder Purchases by Source & by Maize Sales Groups, 2003/04 Marketing Season

<table>
<thead>
<tr>
<th>Maize sales groups</th>
<th>Fertilizer Support Program</th>
<th>Commercial Fertilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of purchasers</td>
<td>50 Kg bags per household</td>
</tr>
<tr>
<td>Top 50% of maize sellers</td>
<td>9,216</td>
<td>20</td>
</tr>
<tr>
<td>Rest of maize sellers</td>
<td>69,321</td>
<td>5</td>
</tr>
<tr>
<td>Households not selling maize</td>
<td>80,161</td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>158,698</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>
Suggestions on Fertilizer

• Do more to build a competitive private sector fertilizer distribution system
  – Broaden private sector dealer networks
  – Focus public fertilizer distribution on viable/profitable areas and crops where private agents are not selling fertilizer

• Invest in research and extension to increase agricultural productivity
  – Crop cultivar, crop choice & agronomic management practices
  – Animal traction
  – Animal disease control and private sector vet drug sales outlets

• Focus policy attention on getting more land (consider options of 20 ha blocks) for smallholders in the customary system

• Improve rural roads to open additional land & cut input and output transport costs

• Enhance role of rural schools to improve learning and skills

Zikomo Kwambili,
Natotela sana,
L'i tumezi ahulu,
Twalumba kapatí,

Thank you to Zambian smallholders and to policy makers for this opportunity to obtain/share information and ideas – we welcome questions and comments