GUIDING INVESTMENT IN SUSTAINABLE AGRICULTURAL INTENSIFICATION IN AFRICA (GISAIA)

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Focus on Malawi in this talk. But discussion generalizable.
GISAIA Promotes and Provides Support for Evidence Based Policy-Making

Five areas of general focus:

1. Efforts to raise the efficiency and profitability of input use by farmers
2. Strategies to improve the effectiveness of input subsidy programs
3. Impact assessment of promising pilot programs
4. Supply chain studies – *ways to reduce costs*
5. Costs of production analysis

Conducted in partnership with local research institutions
Role of Input Subsidies in Sustainable Smallholder Agriculture

QUESTION: The goal of subsidizing improved maize seed varieties and inorganic fertilizer for farmers should be?

A) To increase maize production
B) Reduce poverty
C) Both A + B
D) Neither A nor B

Who should be targeted to participate and ultimately the success of the program depends on how you define the programs goals.
Objectives of Farm Input Subsidy Program (FISP) in Malawi

The official aim is to “increasing maize productivity”, “enhancing rural incomes”, and “promoting food security”.
Input Subsidies, then and now

• A major feature of ag policy in Africa in the 1970s and 1980s
  – Universal subsidies available to all farmers

• Phased out in the 1990s as part of structural adjustment

• Re-emerged across SSA in recent years
  – This time considered “smart subsidies”
  – Target recipient households who meet certain criteria.
Input Subsidies, then and now

- Currently, 7 countries (Nigeria, Ethiopia, Kenya, Zambia, Malawi, Tanzania, and Ghana) account for roughly 2.1 million tons of fertilizer distributed through government fertilizer promotion programs

- These programs cost approx. USD $2 billion

- Substantial share of government budgets
## Program costs in Malawi 2005-2010

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</thead>
<tbody>
<tr>
<td>Total fertilizer subsidized (MT)</td>
<td>131,388</td>
<td>179,000</td>
<td>216,553</td>
<td>202,278</td>
<td>160,000</td>
<td>160,000</td>
</tr>
<tr>
<td>Fertilizer subsidy (%)</td>
<td>64</td>
<td>72</td>
<td>79</td>
<td>91</td>
<td>95</td>
<td>90</td>
</tr>
<tr>
<td>Total maize seed subsidized (MT)</td>
<td>n/a</td>
<td>4,524</td>
<td>5,541</td>
<td>5,365</td>
<td>8,652</td>
<td>8,000</td>
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<tr>
<td>Total legume seed subsidized (MT)</td>
<td>0</td>
<td>0</td>
<td>24</td>
<td>n/a</td>
<td>1,551</td>
<td>1,600</td>
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<tr>
<td>Redemption price (US $/50kg bag)</td>
<td>7.35</td>
<td>6.62</td>
<td>6.31</td>
<td>5.52</td>
<td>3.34</td>
<td>3.25</td>
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<tr>
<td>Total program cost (US $ million)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total cost as % agricultural budget</td>
<td>n/a</td>
<td>61</td>
<td>61</td>
<td>74</td>
<td>62</td>
<td>61</td>
</tr>
<tr>
<td>Total cost as % of national budget</td>
<td>5.6</td>
<td>8.4</td>
<td>8.9</td>
<td>16.2</td>
<td>8.2</td>
<td>6.5</td>
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<tr>
<td>Official Package</td>
<td>Malawi</td>
<td></td>
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<tr>
<td>• Coupons for 100 kg fertilizer</td>
<td>• 2 kg hybrid or 4 kg OPV seed</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Redemption methods</th>
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<tbody>
<tr>
<td>• Fertilizer: gov’t depots</td>
<td>• Seed: private retailers</td>
</tr>
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<table>
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<tr>
<th>% rural pop. reached</th>
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<tr>
<td>• 50-80% of rural households</td>
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<table>
<thead>
<tr>
<th>Median kg’s received</th>
<th></th>
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<tr>
<td>• 50 kg fertilizer, 2 kg seed</td>
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<thead>
<tr>
<th>Eligibility criteria</th>
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<tbody>
<tr>
<td>• Full-time smallholder</td>
<td>• Cannot afford 1-2 bags of fert at market price.</td>
</tr>
<tr>
<td>• 08/09: target resource poor</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Selection process of beneficiaries</th>
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<tr>
<td>• village subsidy program committees &amp; headmen</td>
<td></td>
</tr>
</tbody>
</table>
Targeting issues: Program has generally not reached poor households

- Poor household frequently excluded (Holden and Lunduka, 2012a).

- Female headed household excluded (Chibwana et al., 2012a). May have improved in recent years (Fisher et al. 2014).

- Male households with more physical assets targeted (Ricker-Gilbert et al., 2011).

- Egalitarian distribution of the subsidy reported in many villages.
Fertilizer use has gone up since subsidy was scaled up.

Evidence that subsidized fertilizer crowds out about 20% of commercial fertilizer (Ricker-Gilbert et al. 2011)
Maize : Fertilizer response rates remain low

- Studies based on farm survey data report response rates of kg maize: kg nitrogen between 5.5-12:1 (Ricker-Gilbert and Jayne, 2011; Chibwana et al., 2014).
- For comparison much higher in Kenya. 17:1 on average (Sheahan et al. 2013).
- Experiment station data reports that response rates in Malawi should be between 15-20:1 (Dorward et al. 2008).
- Many reasons for low response rates in Malawi
# Response rates affect program’s returns

<table>
<thead>
<tr>
<th>Year</th>
<th>(A) Market price of maize (US$/kg)</th>
<th>(B) Market price of fertilizer (US$/kg)</th>
<th>(C) Subsidized price of fertilizer (US$/kg)</th>
<th>(D) B/C ratio (market price fertilizer) 8:1</th>
<th>(E) B/C ratio (subsidized fertilizer price)</th>
<th>(F) B/C ratio (subsidized fertilizer price) 15:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/06</td>
<td>0.14</td>
<td>0.39</td>
<td>0.15</td>
<td>0.98</td>
<td>3.10</td>
<td>1.12</td>
</tr>
<tr>
<td>2006/07</td>
<td>0.15</td>
<td>0.49</td>
<td>0.13</td>
<td>0.85</td>
<td>3.81</td>
<td>1.06</td>
</tr>
<tr>
<td>2007/08</td>
<td>0.25</td>
<td>0.59</td>
<td>0.12</td>
<td>1.14</td>
<td>6.95</td>
<td>1.54</td>
</tr>
<tr>
<td>2008/09</td>
<td>0.28</td>
<td>1.25</td>
<td>0.07</td>
<td>0.60</td>
<td>13.39</td>
<td>0.90</td>
</tr>
</tbody>
</table>

- Recipients from the subsidy clearly benefit (E)
- Returns much higher when assume experiment station response rates than observed response rates (F) vs. (D)
Impacts of Subsidy on Poverty (Indirect Evidence)

• Evidence suggests that 20-40% of the subsidized fertilizer has been diverted from intended beneficiaries and resold as commercial fertilizer (Dorward and Chirwa, 2013; Lunduka et al. 2013).

• Small increase in household income from subsidy, no effect on asset wealth (Chirwa, 2010; Ricker-Gilbert and Jayne 2011).

• Recent evidence indicates that the FISP has had a small effect on maize prices, and wage rates (Ricker-Gilbert et al. 2013; Ricker-Gilbert 2013).

• Providing the subsidy to the poorest 20% of households does not cause these households to achieve higher agricultural growth rates (Matilda and Chirwa, 2011).
How to support Smallholders? Input
Subsidies are just one policy tool

- Malawi’s program intends to give everyone the same amount of input (100 kg fertilizer, 2-4 kg maize seed)
- Requires complimentary inputs like land and labor to make use of the seed and fertilizer
- Other options may be better for households who lack complimentary inputs

Diagram:

- **Program:**
  - Food Aid
  - Cash Transfer
  - Flexible Input Voucher
  - FISP
  - Output Price Support

- **Ideal Beneficiary:**
  - Vulnerable household in emergency situation
  - Vulnerable household that is land and labor constrained. Cannot use subsidized inputs effectively
  - Land or labor constrained household. Can use subsidized inputs effectively
  - Household can use subsidized seed and fertilizer effectively. Unable to purchase inputs commercially
  - Productive surplus-producing household. Able to finance input purchases and transport grain to market

- **Social Protection Programs**
- **Production Enhancing Programs**
Policy Workshop In Malawi, Late June

• Need to recognize that it may be difficult to both increase maize production and reduce poverty with an input subsidy program.

• Gradually reduce subsidy rate from 95% to something more reasonable (but politically acceptable).

• Take cost savings from FISP and put them towards social protection programs.
  - cash transfer or cash for work program for poorer households.
• Need to invest in complimentary programs that improve fertilizer effectiveness.
  – Complimentary management practices (organic manure, soil and water conservation).
  – Promotion of intercropping (maize and legume)
  – Timely delivery and application of fertilizer.
  – Better extension services that meet farmers’ needs.

• In the long run there may be better options for public expenditures than on subsidizing fertilizer (infrastructure, new seed varieties, extension, off-farm development).

• Need to provide support in the short run to get smallholders from one season to the next.
What does this mean in the face of rising rural population density in Africa?

Food Policy Special Issue “Revisiting Boserup” Online now.
Only region where rural population is still growing.

- Estimated 48% between 2012-2050 (UN, 2013).
- Population growth rates > 3.0% in some African countries

Linked to:
1. Shrinking farm sizes
2. More continuous cultivation
4. Challenges to achieving broad based inclusive farm income growth
Africa Generally Land Abundant

But areas of very high population density and very small farms (2 acres or less).

What does this mean for smallholder led growth?
Kenya: 40% of Households on 5% of Arable land

What causes this and what does it mean?

Focus group discussions in 5 countries revealed

• Agronomic conditions
• Infrastructure/market issues
• Institutional
• Health/zoonotic
• Labor/capital constraints
Descriptive evidence reveals that larger farms have higher incomes. So benefit to area expansion.

**Relationships between farm size and household income**
Most of the arable land located in only 7 countries (Chamberlin et al. 2014)

7 countries have 85% of available land
- DRC
- Angola
- Congo
- Zambia
- Cameroon
- Mozambique
- CAR

Even in those countries there are constraints to expansion
Sustainably intensifying production is a key component to smallholder growth

Boserupian theory predicts that population density drives intensification

1) Are farmers able to intensify production in the face of high and rising population density?
2) What are the drivers and constraints to smallholder intensification in the face of population density?
3) Is there a threshold beyond which farmers are no longer able to intensify production?
Findings Malawi: As pop density grows..

- Maize prices increase.
- Intensification focused on maize production.
- No increase in value of crop income.
Households more dependent on off-farm income

- But the off-farm jobs are not those that provide opportunities for advancement
- Threshold of rural population density beyond which off-farm income per capita does not increase.
Conclusions-Strategies for overcoming population constraints

Rural-Rural Migration

• Policies the facilitate transfer of land
• Infrastructure investments to make unused land more desirable to migrants

Rural-Urban Migration

• Non-farm growth
• Investment in education to make next generation more competitive
Slowing population momentum

• Better education for girls/women
• Economic opportunities
• More family planning options.

Those who stay - sustainable intensification

• Make intensification more profitable/sustainable (organic manure, intercropping, appropriate fertilizer application).
• Market access
• Movement towards more high value products
Thank you for your time!

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## Returns in Ag Growth to Investments & Subsidies in India, 1960-2000

So what other investments could work?

<table>
<thead>
<tr>
<th>Investments</th>
<th>1960’s</th>
<th>1970’s</th>
<th>1980’s</th>
<th>1990’s</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Return  rank</td>
<td>Return  rank</td>
<td>Return  rank</td>
<td>Return  rank</td>
</tr>
<tr>
<td>Road investment</td>
<td>8.79  1</td>
<td>3.80  3</td>
<td>3.03  5</td>
<td>3.17  5</td>
</tr>
<tr>
<td>Education investment</td>
<td>5.97  2</td>
<td>7.88  1</td>
<td>3.88  3</td>
<td>1.53  3</td>
</tr>
<tr>
<td>Irrigation investment</td>
<td>2.65  5</td>
<td>2.10  5</td>
<td>3.61  4</td>
<td>1.41  4</td>
</tr>
<tr>
<td>Irrigation subsidies</td>
<td>2.24  7</td>
<td>1.22  7</td>
<td>2.28  6</td>
<td>NA  6</td>
</tr>
<tr>
<td>Fertilizer subsidies</td>
<td>2.41  6</td>
<td>3.03  4</td>
<td>0.88  8</td>
<td>0.53  8</td>
</tr>
<tr>
<td>Power subsidies</td>
<td>1.18  8</td>
<td>0.95  8</td>
<td>1.66  7</td>
<td>0.58  7</td>
</tr>
<tr>
<td>Credit subsidies</td>
<td>3.86  3</td>
<td>1.68  6</td>
<td>5.20  2</td>
<td>0.89  2</td>
</tr>
<tr>
<td>Agriculture R&amp;D</td>
<td>3.12  4</td>
<td>5.90  2</td>
<td>6.95  1</td>
<td>6.93  1</td>
</tr>
</tbody>
</table>

Source: Fan et al. 2007