Introduction

- Growing popularity of targeted input subsidy programs in SSA
  - 7 countries, > US$2 billion in 2012 (Ricker-Gilbert et al., 2013)
- Universal subsidies common pre-SAP, then scaled back
- Why the comeback? (Jayne & Rashid, 2013)
  - HIPC
  - Conditionality → direct budget support
  - “Malawi miracle”
  - Rising global food prices since 2007
  - Shift in WB position ?? – support for “smart” subsidies
Introduction (cont’d)

- Input subsidy program (ISP) objectives
  - ↑ access to inputs, ag productivity & production
  - ↑ food security, incomes; ↓ poverty
  - Political: reward supporters, win votes

- Rapidly growing body of literature on ISPs but:
  - Few analyses of effects on incomes, poverty, inequality
  - Seed component largely ignored
  - → our contribution

Objectives (Zambia as case study)

- #1: Subsidized hybrid maize seed received
- #2: Hybrid maize seed planted
- #3: Maize production, Income, Depth of poverty, Income inequality
- #4: Policy implications
Outline

1. Introduction
2. Objectives
3. Zambia
   - Broad overview
   - Input subsidies
   - Hybrid seed use
4. Data & methods overview
5. Results
6. Conclusions & policy implications

Zambia

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Year</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>2013</td>
<td>14.2 mil</td>
</tr>
<tr>
<td>% Rural</td>
<td>2010</td>
<td>64%</td>
</tr>
<tr>
<td>Agric. % of labor force</td>
<td>2004</td>
<td>85%</td>
</tr>
<tr>
<td>GDP/capita (PPP)</td>
<td>2012</td>
<td>$1,700</td>
</tr>
</tbody>
</table>

Of 229 countries, only 27 lower

Maize
- 84% of smallholders grow it; 60% of nat’l calorie consumption
- >85% of government ag spending = maize incentives (input subsidy, maize price support)

Sources: CSO (2011), CIA (2013)
(national poverty line)

Source: CSO (2009, 2011)
Input subsidies in Zambia

Avg. 30% of GRZ ag sector spending, 2004-2011

Seed subsidy rate (%)

MT of subsidized seed

Hybrid maize seed (MT)

Seeds subsidy (%) - right scale

Sources: MAL (2012)

Fertilizer Support Programme (FSP)
2002/03-2008/09, then FISP

- **Official pack***: 400 kg fertilizer, 20 kg seed

- **Targeting criteria:**
  - Vague!
  - Capacity to **cultivate** 1-5 ha of maize
  - Ability to pay farmer share (40-50%)
  - Cooperative membership

- **Objectives:**
  - ↑ maize prod., incomes, *inter alia*
  - ↓ poverty not stated obj. but 47% of PRP
Hybrid seed use

% of smallholder HHs planting maize hybrids

Source: Sitko et al. (2011)

Data

- Nationally-representative panel survey data
- 2002/03 & 2006/07
- 3,542 maize-growing HHs
Methods

Outcomes ($y$)
- Maize production
- Income
- Depth of poverty
- Income inequality

Hybrid maize seed planted ($h$)

Subsidized hybrid maize seed received ($s$)

Other factors ($other_1$)

Other factors ($other_2$)

\[ y = y[h(s, other_1), other_2] \]

\[ \frac{\partial y}{\partial s} = \frac{\partial y}{\partial h} \cdot \frac{\partial h}{\partial s} \]

- Econometric estimation (panel data & IV)

Outcomes: total HH income (ZMK)

- Gross value of crop production
- Gross value of livestock, fish farming production
- Salaries, formal/informal wage/business income
- Remittances, pensions
Outcomes: poverty gap

- Similar to Foster-Greer-Thorbecke poverty gap before averaging over population
- $= 0$
  - if per capita HH income/day ($pcinc$) $\geq$ $2/day$
- $= \left[\frac{($2 - pcinc)/$2}{100}\right]$
  - if $pcinc <$ $2/day$

Outcomes: relative deprivation (income inequality)

- Stark and Taylor’s index of relative deprivation (RD)

$$RD(income_i) = AD_i * P_i$$

- Average income of HHs with income $>$ $HH_i$
- Proportion of HHs with income $>$ $HH_i$
Results: descriptives

<table>
<thead>
<tr>
<th></th>
<th>Planted hybrid</th>
<th>Did not plant hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No subsidy</td>
<td>Subsidy</td>
</tr>
<tr>
<td>% of HHs: 2002/03</td>
<td>26.4</td>
<td>11.0</td>
</tr>
<tr>
<td>% of HHs: 2006/07</td>
<td>31.9</td>
<td>9.8</td>
</tr>
<tr>
<td>Hybrid seed planted (kg)</td>
<td>38.4</td>
<td>26.6</td>
</tr>
<tr>
<td>Maize production (kg)</td>
<td>3,736</td>
<td>2,194</td>
</tr>
<tr>
<td>Income ('000 ZMK)</td>
<td>8,870 ($2,217)</td>
<td>5,815 ($1,454)</td>
</tr>
<tr>
<td>Poverty (=1)</td>
<td>0.81</td>
<td>0.87</td>
</tr>
<tr>
<td>Poverty gap (%)</td>
<td>50.1</td>
<td>59.2</td>
</tr>
<tr>
<td>Relative deprivation ('000 ZMK)</td>
<td>3,656 ($914)</td>
<td>3,852 ($963)</td>
</tr>
</tbody>
</table>

Note: 1% significance for all differences. Unconditional means.

Results: econometric

#1) 1-kg of subsidized seed $\rightarrow$ 0.31 kg hybrid seed

#2) 1-kg of hybrid seed $\rightarrow$

Maize | Income | Poverty gap | Inequality (rel. depriv.)
      |        |            |                        |
      | 24.6 kg| 0.22%      | -0.076 p.p.            | -3,071 ZMK (-$0.77) |

No stat. sig. effect on probability of falling below $2/cap/day poverty line

Note: 1% significance for all estimates
#3) Effect of subsidized seed on outcomes

<table>
<thead>
<tr>
<th>Subsidized seed</th>
<th>Maize</th>
<th>Income</th>
<th>Poverty gap</th>
<th>Inequality (rel. depriv.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kg</td>
<td>7.67 kg</td>
<td>0.07%</td>
<td>-0.023 p.p.</td>
<td>-958 ZMK (-$0.24)</td>
</tr>
<tr>
<td>10 kg</td>
<td>76.7 kg</td>
<td>0.7%</td>
<td>-0.23 p.p.</td>
<td>-0.24% at mean</td>
</tr>
</tbody>
</table>

Note: 1% significance for all estimates

Is benefit > cost of subsidized seed? (Back of the envelope)

- **10 kg subsidized seed**
- **Benefit:**
  - **Income (0.7%)**: $8.59 at mean (logged – need to revisit)
  - **Maize (76.7 kg):**
    - $12.96 at national med. producer price
    - $21.06 at Lusaka lean season retail
- **Cost to farmer**: $6.50
- **Cost to government (incl. admin)**: $11.27
- **Total social cost**: $17.77
- Profitable for farmer but only for society at high maize price (maize)
Conclusions & policy implications

Seed component of FSP:

1. Descriptives: recipients relatively poor but not as poor as HHs not planting maize hybrid
2. ↑ maize production, incomes
3. ↓ poverty gap, income inequality (RD) but NOT probability of falling below $2/day
4. Profitable for farmer but only for society at high maize price (maize)

Fertilizer component of FSP profitable for farmer but NOT society (Mason & Jayne, 2013)

Fertilizer has been focus of FSP/research → seed may have bigger payoffs

Crowding out reducing ‘bang for buck’ (Xu et al., 2009; Ricker-Gilbert et al., 2011; Mason & Ricker-Gilbert, 2013; Mason & Jayne, 2013)
Future research

1. Do results hold since 2006/07?

2. Do they hold with respect to other outcomes?
   - $1.25/day
   - Poverty severity
   - Multi-dimensional poverty

Thank you for your attention

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IAPRI

Food Security Research Project
http://fsg.afre.msu.edu/zambia/index.htm