What is best practice in identifying economic incidence of input subsidies (fertilizer/seed)? In what context?

- Large scale up of input subsidies in Africa since 2006
- 7 countries spending US $2 billion in 2012
- Most are “targeted” programs
  - Distribution not random
    - Makes evaluation difficult
- Nation-wide programs
  - Malawi 60-70% of households participate
  - Potentially large “spill-over” effects
\[ Y_{it} = f( Z_{it}, X_{it}, \varepsilon_{it} ) \]

Is \( Z \) number of vouchers, kilograms of subsidized fertilizer purchased, kilograms of subsidized fertilizer applied to maize?

- If number of vouchers, (eligibility effect)
  - how to account for resale and sharing of fertilizer?
- If kilograms of subsidized fertilizer (participation effect)
  - Is that really measuring the effect of the gov’t program?
Since vouchers and fertilizer not distributed randomly, how to control for potential correlation between $Z_{it}$ and $\varepsilon_{it}$?

$$Y_{it} = f( Z_{it}, X_{it}, \varepsilon_{it} )$$

- Advantage if household panel data available.
  - Use household fixed effects or first differencing to deal with time-constant unobservable factors.
- IV estimation: challenge of finding a good instrument.
  - Modeling subsidized seed and fertilizer = multiple instruments
- Potential RCT: $Z =$ voucher eligibility IV for fertilizer acquisition: Local Average Treatment Effects (LATE)
  - Are you studying a population of interest?
  - External validity?
Returns to maize production from additional kg of subsidized fertilizer in Malawi

<table>
<thead>
<tr>
<th>Covariates¹</th>
<th>FD</th>
<th>Panel Quantile Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cond. mean est.</td>
<td>10%tile</td>
</tr>
<tr>
<td>Kg sub. fertilizer</td>
<td>2.71***</td>
<td>0.86***</td>
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</tbody>
</table>

- Returns to subsidized fertilizer are small but positive and statistically significant
- Returns higher at the top of maize production distribution than at bottom
  - mean return higher than median return
- People at bottom poorer, lower management ability and worse soil fertility.

Note: *, **, *** indicates that corresponding coefficients are significant at the 10%, 5%, and 1% level respectively; other controls included in model
How should different types of ag. subsidies be modeled given the general lack of data in surveys on which farmers are benefiting from these programs?

- National production estimates may be politicized
- Household-level data likely more objective and accurate (still could be subject to measurement error)
- Gates foundation funded, World Bank implemented LSMS surveys providing a great deal of useful information.
What options are available to take into account behavioral response and general equilibrium effects?

• Large scale program, could have “spill-over” effects.

**BENEFITS**

1) lower maize prices
   - evidence suggest small downward effects
2) higher wage rates
   - evidence suggests small upward effects

**COSTS**

3) leakages
   - evidence suggests may be quite large
4) crowding out
   - evidence suggest may be significant
Thank you for your time!

jrickerg@purdue.edu