Transforming Smallholder Agriculture in the Face of Rising Land Scarcity and Low Productivity

T.S. Jayne, with Kwame Yeboah, Lulama Traub, Milu Muyanga, Jordan Chamberlin, Ferdinand Meyer

Keynote Address, Tegemeo Institute Agricultural Policy Conference, Nairobi, November 10, 2015
Six “mega-trends”
Trend #1:

Urbanization and shift from farm to off-farm employment
Jobs by sector, Sub-Saharan Africa

Source: World Bank (Filmer and Fox), 2014
Jobs by sector, Sub-Saharan Africa

Source: World Bank (Filmer and Fox), 2014
African Population by Income Class: excluding North Africa and South Africa

Source: Potts, 2012: calculated from the AfDB (2010)

81.8% Poor ($0 - $4)
13.4% Middle-class ($4 - $20)
4.8% Rich (> $20)

2010
Trend #2:

Huge rise in demand for marketed food
Net Grain Exports for Southern Africa

Net Export for Southern African (without South Africa)

Millions of Tons

Year


Maize Wheat Rice Total Net Export

Net Export for Southern African (without South Africa)

Millions of Tons

Source: FAO, 2015
Net Grain Exports for West Africa

Source: FAO, 2015

Year
-15 -10 -5 0

Maize Wheat Rice Total Net Export

Net Export for Western Africa

Millions of Tonnes

Source: FAO, 2015
Trend #3:

The ‘Youth Bulge’
Trend #3: Rising numbers of youth entering labor force

Source: UN Pop Council, 2013
Looming rural employment challenge in SSA

Source: UN 2013
Trend #4:

Rising land scarcity
Clustering of rural populations: Kenya
Adjusted prices in Northern Tanzania 2008-2013

Survey year

Adjusted price (2008/9=100)

Agricultural wage (TSH/day)

Land rental rate (TSH/ha)

Maize (TSH/kg)
Ag wage, land rental prices, and maize prices in high-potential Ethiopia
F2. Trends in fertilizer use and cropping intensity

Nitrogen application per hectare

Cereal cropping intensity (area harvested/area planted at least once)
The importance of SOM
Trend #5:

Rise of medium-scale ‘investor’ farmers
% of National Landholdings held by Urban Households

<table>
<thead>
<tr>
<th>Year</th>
<th>Ghana</th>
<th>Kenya</th>
<th>Malawi</th>
<th>Rwanda</th>
<th>Tanzania</th>
<th>Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>26.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td>22.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td>11.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td>10.9%</td>
<td>11.8%</td>
<td></td>
</tr>
<tr>
<td>2004/2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32.7%</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16.8%</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013/2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22.0%</td>
</tr>
</tbody>
</table>
Crop sales by farm size over time (2011 Zmk prices)

Source: MACO CFS 2000/1 to 2010/11 and authors’ computations

Largest smallholder farms (8%) consistently doing better
Trend #6: Climate change
Recap: Six “mega-trends”

1. Growth in non-farm employment – urbanization - rising labor productivity
2. Rising food deficits / dependence on world markets for food
3. Youth bulge/labor force expansion
4. Rising land scarcity, land prices, land degradation
5. Rise of medium-scale investor farmers
6. Climate change
Main conclusions:

1. For the next 2-3 decades, most Africans will be engaged in farming

   - ~ 10% African farmers are already commercialized and contributing to ST
   - ~ 30% --with appropriate support -- have potential to be successful in farming
   - ~ 60% : difficult to pull out of poverty via farming, but raising their productivity will contribute indirectly to poverty reduction indirectly
Main conclusions (ii)

2. Most rural people will gradually exit farming

3. The pace at which they leave depends on non-farm job growth

4. Non-farm job growth will depend on ag growth!
   
   — Full circle: how to transform the ag. sector?
Now: What to do?
Now: What to do?

Business as usual won’t do!
Strategies for public sector consideration

• Much greater funding of
  – crop and animal R&D
    • Pest and disease control
    • Sustainable intensification technologies / practices / biomass
      • Technologies appropriate for small farms
        – extension systems: Bi-directional learning
        – infrastructure
        – Urban planning
  • Support for local policy analysis units
Sectoral shifts in labor force: China
Sectoral shifts in labor force: Ethiopia

Source: Groningen Global Development Centre, 2013
Sectoral shifts in labor force: Tanzania

Source: Groningen Global Development Centre, 2013
Sectoral shifts in labor force: Nigeria

Source: Groningen Global Development Centre, 2013
Sectoral shifts in labor force: Ghana

Source: Groningen Global Development Centre, 2013
Labor productivity per worker, Ghana

Year

Productivity (US$ per worker per year in thousands)


Agriculture
Manufacturing
Business/trade
Avg annual agricultural growth vs. Avg annual change in rural poverty

- Red dots: Growth without poverty reduction
- Green dots: Growth with poverty reduction

Countries:
- Botswana
- Burkina Faso
- Cameroon
- Congo, Rep.
- Cote d'Ivoire
- Guinea
- Guinea-Bissau
- Malawi
- Mozambique
- Namibia
- Nigeria
- Rwanda
- South Africa
- Togo
- Tanzania
- Togo
- Madagascar
- Mali
- South Africa
- Senegal
- Ghana
- Ethiopia
- Guinea
- Rwanda
- Tanzania
- Togo
- South Africa
- Nigeria
- Namibia
- Botswana
- Burkina Faso
- Senegal
- Pakistan

Values:
- Avg annual agricultural growth
- Avg annual change in rural poverty

Legend:
- Growth without poverty reduction
- Growth with poverty reduction
Value of Crop Production in Relation to time in hours to Towns of 100,000 and over

Source: Paul Dorosh et al., 2013
# Review of maize-fertilizer response rates on farmer-managed fields

<table>
<thead>
<tr>
<th>Study</th>
<th>country</th>
<th>Agronomic response rate (kgs maize per kg N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marenya and Barrett (2009)</td>
<td>Kenya</td>
<td>17.6</td>
</tr>
<tr>
<td>Liverpool-Tasie (2015)</td>
<td>Nigeria</td>
<td>8.0</td>
</tr>
<tr>
<td>Burke (2012)</td>
<td>Zambia</td>
<td>9.6</td>
</tr>
<tr>
<td>Snapp et al (2013)</td>
<td>Malawi</td>
<td>7.1 to 11.0</td>
</tr>
<tr>
<td>Holden and Lunduka (2011)</td>
<td>Malawi</td>
<td>11.3</td>
</tr>
<tr>
<td>Pan and Christiaensen (2012)</td>
<td>Tanzania</td>
<td>11.8</td>
</tr>
<tr>
<td>Mather et al (2015)</td>
<td>Tanzania</td>
<td>5.7 to 7.8</td>
</tr>
</tbody>
</table>
Variation in farmers’ efficiency of fertilizer use on maize, Agro-ecological Zone IIa, Zambia

Note: Zone IIa is a relatively high-potential zone suitable for intensive maize production.
F3. Trends in Irrigation and cropping intensity

- **Kenya**
- **Malawi**
- **India 2009**
- **Thailand 2009**
- **Uganda**
- **Nigeria**

Irrigated crop area (% total)

Cereal cropping intensity (area harvested/area planted at least once)