Agriculture and Africa’s Structural Transformation

Presented to the Wilson Center and USAID Alumni Association panel discussion on
Africa: Agriculture, Structural Change and the Urban Imperative
by
Steven Haggblade
Michigan State University
May 22, 2013
Outline

1. Structural transformation
2. Agriculture’s role
3. Spatial implications
4. Household transitions
## 1. Structural transformation

<table>
<thead>
<tr>
<th>Country</th>
<th>Income ($/person)</th>
<th>Agriculture (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>46,000</td>
<td>1</td>
</tr>
<tr>
<td>Korea</td>
<td>25,000</td>
<td>3</td>
</tr>
<tr>
<td>Brazil</td>
<td>9,400</td>
<td>5</td>
</tr>
<tr>
<td>China</td>
<td>5,400</td>
<td>12</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>2,500</td>
<td>20</td>
</tr>
<tr>
<td>Cambodia</td>
<td>1,700</td>
<td>30</td>
</tr>
<tr>
<td>Ghana</td>
<td>1,300</td>
<td>36</td>
</tr>
<tr>
<td>Ethiopia</td>
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<td>46</td>
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### 1. Structural transformation

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</table>
Structural transformation
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Engel’s Law

1
Structural transformation

Engel’s Law
Structural transformation

Engel’s Law
1. Structural transformation

- *Productivity gains* drive structural transformation.

- Two-thirds of Africans work in agriculture.

- *Agricultural productivity gains* offer the most powerful lever for:
  - raising productivity of African workers
  - driving structural transformation
  - and economic growth.
Outline

1. Structural transformation
2. *Agricultural productivity drivers*
3. Spatial transitions
4. How do households navigate these transitions?
5. Policy implications
Farm productivity
Farm productivity drivers

• R&D
• Extension
• Improved agronomic practices
• Worker health and nutrition
• Input markets
Farm productivity without markets?
Requirements for agricultural growth

- On-farm productivity
- Market access
Zambia Maize Value Chain, 2006

Consumption

Retention

Processing

Maize retailing

Wholesaling

Farming

Subsistence Producers $Q = 500$

Mugaiwa Consumers $Q = 600$

Mealie Meal Consumers $Q = 500$

Livestock $Q = 50-100$

Beer $Q = 30-60$

Retailers

Channel 1 Subsistence Production

Hammer Mills $Q = 600$

Channel 2 Small Commercial

Small traders

Large Traders

FRA $Q = 110$

Small Farms $Qty = 150$

Commercial farms $Qty = 250$ TMT

Channel 3 Large

Channel 4 Animal Feed

Channel 5 Brewing

Channel 6

Small traders

Millers $Q = 500$

Feed companies $Q = 50-100$

Brewers $Q = 30-60$
Zambia Maize Value Chain, 2006

**Consumption**
- Subsistence Producers: Q = 500

**Retailing**
- Mugaiwa Consumers: Q = 600
- Mealie Meal Consumers: Q = 500
- Retailers

**Processing**
- Hammer Mills: Q = 600
- Millers: Q = 500
- Large Traders
- Small Traders
- FRA: Q = 110

**Wholesaling**
- Small Farms: Qty = 150
- Commercial Farms: Qty = 250 TMT

**Farming**
- Subsistence Production: Channel 1
- Small Commercial: Channel 2
- Large: Channel 3
- Animal Feed: Channel 4
- Brewing: Channel 5
- Livestock: Q = 50-100
- Beer: Q = 30-60
- Feed companies: Q = 50-100
- Brewers: Q = 30-60
- Small traders
- Large traders
Zambia Maize Value Chain, 2006

Consumption
- Subsistence Producers Q = 500

Maize retailing
- Hammer Mills Q = 600
- Millers Q = 500

Processing
- FRA Q = 110
- Small traders
- Large Traders
- Small Farms Qty = 150
- Commercial farms Qty = 250 TMT

Retailing
- Mugaiwa Consumers Q = 600
- Mealie Meal Consumers Q = 500

Wholesaling
- Retailers
- Feed companies Q = 50-100
- Brewers Q = 30-60

Maize retailing
- Live-stock Q = 50-100
- Beer Q = 30-60

Farming
- Channel 1 Subsistence Production
- Channel 2 Small Commercial
- Channel 3 Large
- Channel 4 Animal Feed
- Channel 5 Brewing
Zambia Maize Value Chain, 2006

- **Consumption**
  - Mugaiwa Consumers: Q = 600
  - Mealie Meal Consumers: Q = 500
  - Livestock: Q = 50-100
  - Beer: Q = 30-60

- **Retailing**
  - Retailers

- **Processing**
  - Hammer Mills: Q = 600
  - Millers: Q = 500
  - Feed companies: Q = 50-100

- **Wholesaling**
  - Large Traders
  - Small Traders

- **Farming**
  - Subsistence Producers: Q = 500
  - Large Farms: Qty = 250 TMT
  - Commercial Farms: Qty = 150
  - Small traders

- **Maize retailing**
  - FRA: Q = 110

- **Channels**
  - Channel 1: Subsistence Production
  - Channel 2: Small Commercial
  - Channel 3: Large
  - Channel 4: Animal Feed
  - Channel 5: Brewing

- **Livestock**
  - Q = 50-100

- **Beer**
  - Q = 30-60
Nigeria Cassava Value Chain, 2000

- **Farming**: Subsistence Farms
  - Channel 1: Subsistence Farming
  - Fresh Cassava Production
    - Mobile Graters
  - Commercial Fresh Production
- **Processing**: Fresh Cassava Retailers
  - Subsistence Farming Channel
  - Small-scale gari plants
  - Channel 2: Fresh Marketing
- **Distribution**: Gari Retailers
  - Small-scale gari processors
  - Medium-scale gari processors
  - Channel 3: Small-scale Gari
  - Channel 4: Medium-scale Gari
- **Final markets**:
  - Gari Volume = 25% of total harvest
  - Feed 10%
  - Other* 6%
  - Fresh Cassava Volume = 17%
  - Gari Volume = 42%
  - Industrial Feed Markets
  - 5,000
  - Channel 5: Feed Markets
  - Channel 6: Industrial markets
  - Industrial Processors
  - 10
  - Subsistence Farms
  - 800
Nigeria Cassava Value Chain, 2000

Final markets

Distribution

Processing

Farming

Gari Volume = 25% of total harvest

Subsistence Farms

Channel 1
Subsistence Farming

Fresh Cassava Retailers

Commercial Fresh Production

Mobile Graters

Small-scale gari plants

Medium-scale gari processors

Gari Retailers

Feed Retailers

Feed Mfrs

Industrial

Channel 2
Fresh Marketing

Channel 3
Small-scale Gari

Channel 4
Medium-scale Gari

Channel 5
Feed Markets

Channel 6
Industrial markets

Fresh cassava Volume = 17%

Gari Volume = 42%

Feed 10%

Other* 6%

Industrial Procesors

10

5,000

Volume = 17%

Volume = 42%

Volume = 42%

Volume = 10%

Other* 6%

10

5,000

Volume = 17%

Volume = 42%

Volume = 42%

Volume = 10%

Other* 6%

10

5,000

Volume = 17%

Volume = 42%

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Volume = 42%

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Volume = 10%

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5,000

Volume = 17%

Volume = 42%

Volume = 42%

Volume = 10%

Other* 6%
Nigeria Cassava Value Chain, 2000

Final markets
- Gari Volume = 25% of total harvest

Distribution

Processing

Farming
- Subsistence Farms
- Fresh Cassava Retailers
- Mobile Graters
- Commercial Fresh Production
- Channel 1 Subsistence Farming
- Channel 2 Fresh Marketing
- Channel 3 Small-scale Gari
- Channel 4 Medium-scale Gari
- Channel 5 Feed Markets
- Channel 6 Industrial markets

Commercial Cassava Production
- Gari Retailers
- Medium-scale gari processors
- Small-scale gari plants
- 800

Gari Volume = 42%

Feed 10%

Other* 6%

Feed Retailers

Industrial Processors 5,000

Retailers

800

Fresh cassava Volume = 17%

Volume = 10%

0
Nigeria Cassava Value Chain, 2000

Final markets
- Gari Volume = 25% of total harvest

Distribution

Processing
- Fresh Cassava
  - Volume = 17%
- Gari Retailers
- Mobile Graters
- Small-scale gari plants
- Medium-scale gari processors
  - 800

Farming
- Subsistence Farms
  - Channel 1: Subsistence Farming
- Commercial Fresh Production
  - Channel 2: Fresh Marketing

Commercial Cassava Production
  - Channel 3: Small-scale Gari
  - Channel 4: Medium-scale Gari
  - Channel 5: Feed Markets
  - Channel 6: Industrial markets

Gari
- Volume = 42%
- Gari Retailers
- Feed Retailers
- Feed Mftrs
  - Industrial Procессors
  - 5,000

Feed
- Volume = 10%
- Retailers

Other*
- Volume = 6%
Marketing efficiency

Source: Jayne et al. (2010)
Poor roads, low volumes, high marketing cost
Marketing productivity drivers

- Rural towns
- Assembly and wholesale markets
- Rural electrification
- Roads
- Telecommunications
- Competition
Marketing productivity drivers

• Rural towns
• Assembly and wholesale markets
• Rural electrification
• Roads
• Telecommunications
• Competition
• Open borders
Maize Market Sheds in ESA
African borders
Cross-border trade
Requirements for agricultural growth

- On-farm productivity
- Market access
Technology spills over across AEZ’s
Outline

1. Structural transformation
2. Agricultural productivity drivers
3. Spatial transitions
4. How do households navigate these transitions?
5. Policy implications
Trends in LDC Population Distribution

![Chart showing population distribution trends from 1800 to 2050 for Rural, Towns, and Large cities.](chart.png)
African population trends

Source: UN Urban Projections (http://esa.un.org/unup/)
## Spatial Distribution of Population, 2005

<table>
<thead>
<tr>
<th>Region</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>small</td>
<td>large*</td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>51%</td>
<td>25%</td>
<td>24%</td>
</tr>
<tr>
<td>Developed countries</td>
<td>26%</td>
<td>40%</td>
<td>35%</td>
</tr>
<tr>
<td>Developing countries</td>
<td>57%</td>
<td>22%</td>
<td>21%</td>
</tr>
<tr>
<td>Least developed</td>
<td>73%</td>
<td>16%</td>
<td>11%</td>
</tr>
<tr>
<td>Latin American</td>
<td>23%</td>
<td>37%</td>
<td>40%</td>
</tr>
<tr>
<td>South-Eastern Asia</td>
<td>56%</td>
<td>29%</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Sub-Saharan Africa</strong></td>
<td>65%</td>
<td>20%</td>
<td>15%</td>
</tr>
</tbody>
</table>

* Large cities include those with population over 500,000.

# Employment Share, by Locality Size

<table>
<thead>
<tr>
<th>Country (year)</th>
<th>Total Labor</th>
<th>Agriculture</th>
<th>Total Nonfarm</th>
<th>Mfr.</th>
<th>Commerce &amp; Transport</th>
<th>Personal &amp; Financial Services</th>
<th>Construction, Utilities and Mining</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ISIC Code</strong></td>
<td>1</td>
<td>2-9</td>
<td>3</td>
<td></td>
<td>6 &amp; 7</td>
<td>8 &amp; 9</td>
<td>2, 4 &amp; 5</td>
</tr>
<tr>
<td><strong>Bangladesh, 2000</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>100</td>
<td>58</td>
<td>42</td>
<td>10</td>
<td>17</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Small urban</td>
<td>100</td>
<td>16</td>
<td><strong>84</strong></td>
<td>27</td>
<td><strong>28</strong></td>
<td><strong>23</strong></td>
<td>6</td>
</tr>
<tr>
<td>Dhaka &amp; Chitt.</td>
<td>100</td>
<td>8</td>
<td>92</td>
<td>26</td>
<td>29</td>
<td>32</td>
<td>5</td>
</tr>
<tr>
<td><strong>Chile, 1984</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>100</td>
<td>65</td>
<td>35</td>
<td>5</td>
<td>9</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Small urban</td>
<td>100</td>
<td>7</td>
<td><strong>93</strong></td>
<td>14</td>
<td><strong>29</strong></td>
<td><strong>41</strong></td>
<td>9</td>
</tr>
<tr>
<td>Santiago</td>
<td>100</td>
<td>1</td>
<td>99</td>
<td>20</td>
<td>26</td>
<td>46</td>
<td>7</td>
</tr>
<tr>
<td><strong>Zambia, 2000</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>100</td>
<td>90</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Small urban</td>
<td>100</td>
<td>22</td>
<td><strong>78</strong></td>
<td>7</td>
<td><strong>31</strong></td>
<td><strong>30</strong></td>
<td><strong>10</strong></td>
</tr>
<tr>
<td>Lusaka</td>
<td>100</td>
<td>0</td>
<td>100</td>
<td>14</td>
<td>22</td>
<td>54</td>
<td>10</td>
</tr>
</tbody>
</table>

## Household transitions in Tanzania

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Percent per hh</td>
<td>Share of total</td>
</tr>
<tr>
<td>Farm → farm</td>
<td>1,369</td>
<td>61</td>
<td>0.18</td>
</tr>
<tr>
<td>Farm → middle</td>
<td>1,106</td>
<td>134</td>
<td>0.42</td>
</tr>
<tr>
<td>Farm → city</td>
<td>219</td>
<td>233</td>
<td>0.17</td>
</tr>
<tr>
<td>Middle → farm</td>
<td>210</td>
<td>48</td>
<td>0.04</td>
</tr>
<tr>
<td>Middle → middle</td>
<td>306</td>
<td>99</td>
<td>0.11</td>
</tr>
<tr>
<td>Middle → city</td>
<td>91</td>
<td>234</td>
<td>0.08</td>
</tr>
<tr>
<td>Total</td>
<td>3301</td>
<td>104</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: Christiansen et al. (2013)
Outline

1. Structural transformation
2. Agricultural productivity drivers
3. Spatial transitions
4. How do households navigate these transitions?
5. Policy implications
Group 1
Group 2
Group 2
Distinguishing the two groups

• **Group 1.** Successful commercial smallholder farmers
• **Group 2.** Subsistence farmers $\rightarrow$ children transition out of agriculture
How many make the transition?

Zambia 2008

<table>
<thead>
<tr>
<th>Farm category</th>
<th>Percent of Small and Medium Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maize</td>
</tr>
<tr>
<td>Top half of sales</td>
<td>3</td>
</tr>
<tr>
<td>Bottom half of sales</td>
<td>36</td>
</tr>
<tr>
<td>Growers with no sales</td>
<td>62</td>
</tr>
<tr>
<td>Total growers</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Chapoto et al. (2013)
Both groups require agricultural productivity gains to succeed!

• Group 1. Competes with Brazil
• Group 2. Transition children out of agriculture
  → lower land and labor requirements
  → release child labor for schooling
  → enable parents to pay school fees
How long does the transition take?

<table>
<thead>
<tr>
<th>Japan</th>
<th>Nonfarm share of farm household income (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>22</td>
</tr>
<tr>
<td>1960</td>
<td>42</td>
</tr>
<tr>
<td>1970</td>
<td>63</td>
</tr>
<tr>
<td>1980</td>
<td>80</td>
</tr>
<tr>
<td>1987</td>
<td>87</td>
</tr>
</tbody>
</table>

Source: Haggblade, Hazell and Reardon (2007)
Outline

1. Structural transformation
2. Agricultural productivity drivers
3. Spatial transitions
4. How do households navigate these transitions?
5. Policy implications
Causal relationships

Productivity per capita (agriculture, nonfarm)
→ Changing sectoral demand
→ Shifting sectoral composition of economy
  (+ Agriculture, ++ Industry, +++ Services)
→ Spatial transition (+ rural towns, + cities)
→ Shift in household livelihood strategies
4. Policy requirements

• **Productivity gains** (agricultural R&D, extension, input markets, rural towns)

• **Markets** (rural towns, assembly & wholesale markets, rural roads, electrification)

• **Open borders** (technology transfer, markets)

• **Rural education**
4. Investment requirements

- Agricultural R&D
- Rural towns
- Open borders
- Rural education